PB-242 029

A MODEL COUNTYWIDE COLLECTION AND DISPOSAL SYSTEM FOR CLARK COUNTY, ARKANSAS

Clark County

Prepared for:

Environmental Protection Agency

1975

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE

195120

BIBLIOGRAPHIC DATA SHEET

1. Report No.
SW- 84d

2.

3. Recipient's Accession No.

4. Title and Subtitle
A Model Countywide Collection and Disposal System for Clark County, Arkansas

5. Report Date
1975

6.

7. Author(s)
Clark County Parks, Recreation & Planning

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Clark County, Arkansas
County Court House
Arkadelphia, Arkansas 71923

10. Project/Task/Work Unit No.

11. Contract/Grant No.
S-801-750-01-2

12. Sponsoring Organization Name and Address
U.S. Environmental Protection Agency
Office of Solid Waste Management Programs
Washington, D.C. 20460

13. Type of Report & Period Covered
Final

14.

15. Supplementary Notes

16. Abstracts

The purpose of this project was to establish a model county-wide rural collection system and sanitary landfill. For the most part, four-cubic-yard containers were used to provide collection service for rural and unincorporated areas. A sanitary landfill was established to serve the entire county. The final report describes the planning, design, implementation and cost of the county-operated collection and disposal operation and also provides a detailed account of a major dump closing.

17. Key Words and Document Analysis. 17a. Descriptors

Collection, Containers, Refuse Disposal

17b. Identifiers/Open-Ended Terms

Rural Areas, Storage of Wastes, Dump Closing

17c. COSATI Field/Group

PRICES SUBJECT TO CHANGE

18. Availability Statement

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page)
UNCLASSIFIED

21. No. of Pages
167

22. Price
$6.25-2.25

195120

PB 243 029

A MODEL COUNTYWIDE COLLECTION AND DISPOSAL SYSTEM
FOR CLARK COUNTY, ARKANSAS

This final report (SW-84d) describes work performed
for the Federal solid waste management programs under Grant No. S-801-760-01-2
to CLARK COUNTY, ARKANSAS
and is reproduced as received from the grantee

U.S. ENVIRONMENTAL PROTECTION AGENCY

1975

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An environmental protection publication (SW- 84d) in the solid waste management series.

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INTRODUCTION

The Problem

Simply stated, the solid waste problems existing prior to project implementation were brought about because there were no county or municipally regulated collection or disposal systems. Refuse collection was accomplished very inefficiently by the 15-20 private trash haulers operating primarily in urban areas. Industry and businesses were left to their own devices for trash collection.

Disposal was by open dumping. There were more than nine (9) open dumps in existence prior to project implementation. "Operation" of two of these dumps consisted of burning as a means of volume reduction and periodic burial of the ash. Other dumps, smaller in scale, were merely left open; most were covered periodically by the County.

County Description

For Clark County, Arkadelphia is the county seat and the largest concentration of population with 9,841 people. The total Clark County population is 21,543 with 45.68 per cent classified as urban and 54.32 per cent as rural. Table 1 presents the breakdown of population for the County and all incorporated areas.

Table 1. POPULATION DISTRIBUTIONS

Unit	Population	%Population	Households	%Households
Arkadelphia	9,841	45.69	2,300	44.31
Gurdon	2,075	9.63	500	9.63
Amity	614	2.88	145	2.80
Gum Springs	269	1.20	60	1.16
Okolona	233	1.08	55	1.06
Whelen Springs	126	0.59	30	0.59
Rural (Non incorporated areas)	8,385	38.93	2,100	40.46
Total	21,543	100.00	5,190	100.00

It is helpful to include in a population analysis a picture of the growth pattern over a period of years. Table 2 presents the trend of population growth since 1890.

Table 2. CLARK COUNTY POPULATION TRENDS

Year	Population
1890	20,997
1900	21,289
1910	23,686
1920	25,632
1930	24,932
1940	24,402
1950	22,998
1960	20,950
1964	21,539*
1970	21,543**

*Bureau of Census 1964 Revision
**1970 Census Tract Figures

From 1920 to 1960, the trend has been an outward migration and a decrease in population. However, Clark County gained in population 25 per cent over a ten year period from 1960 to 1970. The presence of industry, the potential to attract new businesses and industry and the development of DeGray Reservoir point to a probable steady increasing population trend in the years to come. More importantly, Clark County can expect to increase two to three times its size in population during peak visitation periods for DeGray Lake.

The physical characteristics of Clark County include three basic land resource areas of the twelve found in Arkansas. The three resource areas are as follows:

(1) Ouachita Mountains: This area is composed of about 17,668 acres in the northwest part of the County, two-thirds of which are in commercial timberland. The topography is from gently rolling to very steep and mountainous.

Elevations range from 400 to 600 feet above sea level.

(2) Blackland Prairies: This area is composed of about 48,697 acres in the central and western part of the County. The topography is from nearly level to moderately steep slopes of up to 12 per cent. Elevations range from 200 to 400 feet above sea level.

(3) Forested Coastal Plain: This area is composed of about 338,286 acres and covers most of the County south of the Ouachita Mountains area exclusive of the Blackland prairies. The topography is from nearly level to hilly. Elevations range from 180 to 300 feet above sea level.

There are nine different soil classifications in the County according to The Soil Conservation Service of Clark County. These soil types are keyed to the soil map in Figure 1 and are summarized on the pages following the map.

The land area of the entire County drains into the Ouachita River. The mean annual precipitation is 57 inches, the greater part occurring during the winter and spring months.

Clark County consists of 561,920 acres of land. Approximately 75 per cent or 422,000 acres of that land area is woodland and classified as commerical forest.

CLARK COUNTY SOILS MAP LEGEND

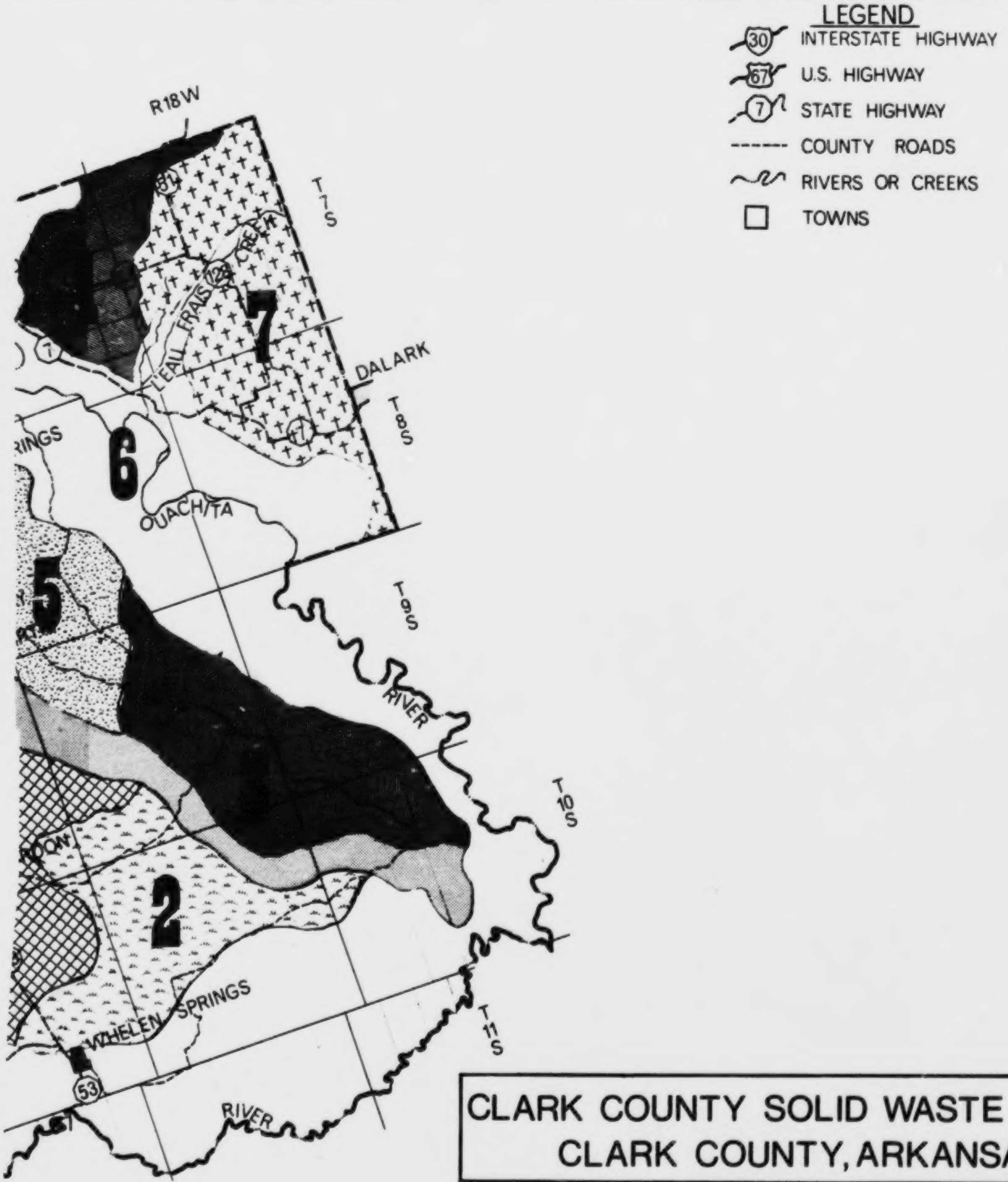
1 AMY-SMITHTON ASSOCIATION: Deep, slowly permeable, poorly drained, acid, loamy soils on broad flats in the coastal plain. Amy 60%, Smithton 30% (inclusions of Cahaba and Blevins 10%). Amy soils have gray to grayish-brown silt loam surface soil and light brownish-gray or gray, mottled silt loam or silty clay loam subsoil. Smithton soils have very dark grayish-brown to light brownish-gray fine sandy loam surface soil over light brownish-gray or gray, mottled fine sandy loam or loam subsoil.

2 BLEVINS-SACUL ASSOCIATION: Deep, moderately and slowly permeable, well and moderately well drained, acid, loamy soils on gently and moderately sloping hilltops and ridges on rolling coastal plain uplands. Blevins 35%, Sacul 35% (inclusions of Ruston, Tiak, Saffell and Savannah 30%). Blevins soils have dark grayish-brown or brown loam surface soil over yellowish-brown loam, sandy clay loam or silty clay loam subsoil. Sacul soils have dark grayish-brown or brown silt loam on sandy loam surface soil over yellowish-red or red silty clay or clay subsoil, mottled gray in the lower part.

3 KIRVIN-CAHABA ASSOCIATION: Deep, moderately slowly and moderately permeable, well drained, acid, loamy soils on gently and moderately sloping hilltops and ridges of rolling coastal plain uplands. Kirvin 45% Cahaba 40% (inclusions of Luverne, Kalmia, Sacul and Caddo 15%). Kirvin soils have brown fine sandy loam surface soil over yellowish-red or red silty clay or sandy clay subsoil. Cahaba soils have brown fine sandy loam surface soil over yellowish-red or red sandy clay loam subsoil.

4 LEEPER-TEROUGE ASSOCIATION: Deep, very slowly permeable, somewhat poorly drained, neutral to alkaline and calcareous, clayey soils on stream flood plains in the blacklands area. Leeper 45%, Terouge 30% (inclusions of Kaufman, Houlka, Una, and Marietta 25%). Leeper soils have very dark grayish-brown silty clay surface soil over dark grayish-brown, mottled clay subsoil. Terouge soils are very dark gray clay to depths of six feet or more.

5 OKTIBBEHA-SUMTER ASSOCIATION: Moderately deep, slowly to very slowly permeable, moderately well and well drained, acid to alkaline and calcareous, clayey soils on gently and moderately sloping, rolling uplands in the blacklands area. Oktibbeha 40%, Sumter 35%, (inclusions of Demopolis, Sessum, Kipling, Kaufman and Terouge 25%). Oktibbeha soils have brown to dark brown silt loam to clay surface soil over red clay subsoil, mottled yellow and gray in the lower part. Sumter soils have gray to olive clay surface soil over pale yellow to olive clay subsoil, overlying gray chalk or marl.


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
COUNTY ROADS
RIVERS OR CREEKS
☐ TOWNS
R18W
81
T7S
L'EAU FRAIS CREEK
128
7
7
DALARK
7
T8S
RINGS
6
OUACHITA
5
T9S
RIVER
T10S
2
WHELEN SPRINGS
T11S
53
67
RIVER

CLARK COUNTY SOLID WASTE STUDY CLARK COUNTY, ARKANSAS			
FIGURE 1 page 2 GENERAL SOIL MAP			
DRAWN BY	W.H.A.	1-'73	DATE: 1- -'73
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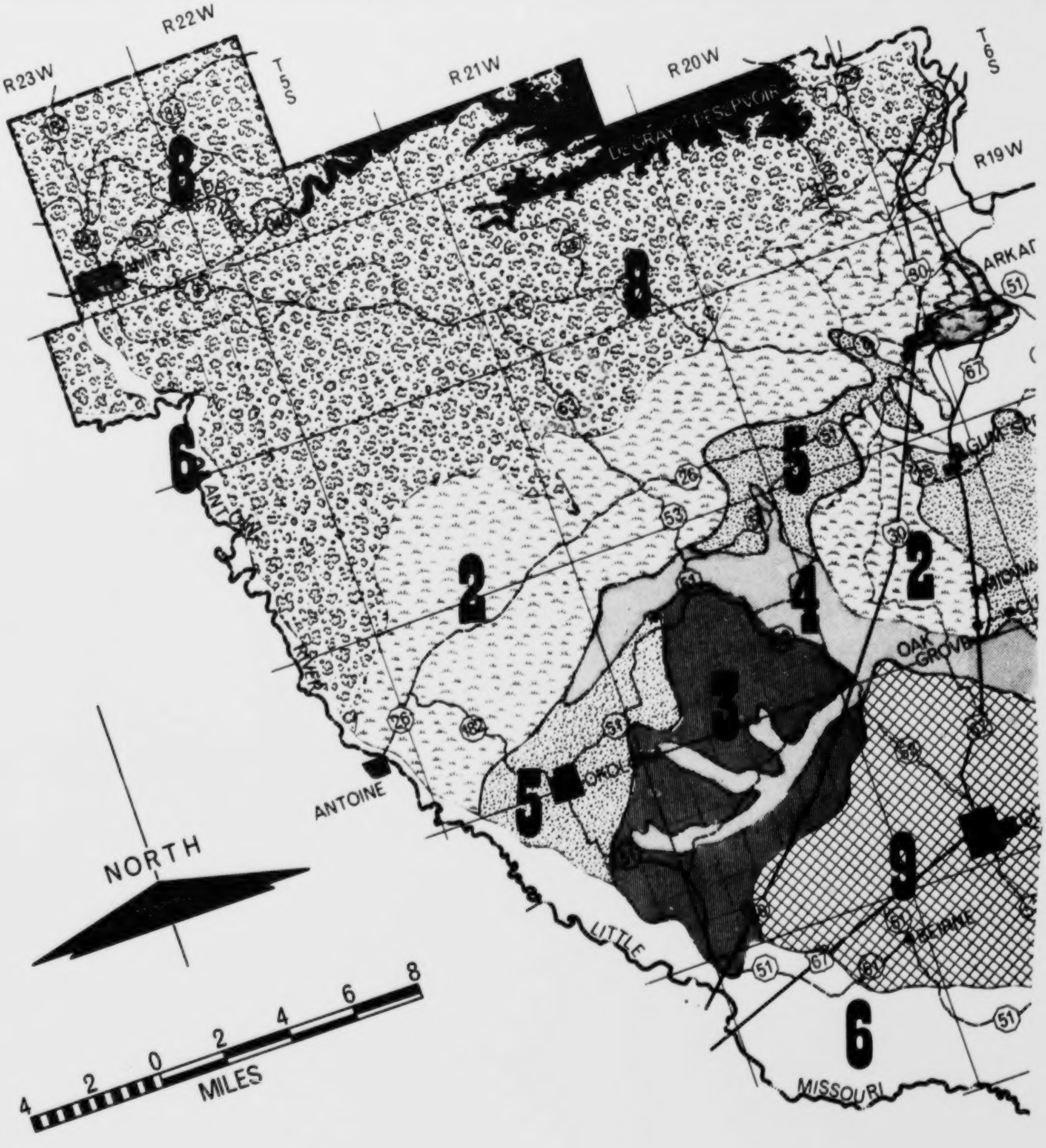

R22W
R23W
T5S
R21W
R20W
T6S
R19W
DEGRAY RESERVOIR
AMITY
ARKAD
GUM SP
OAK GROVE
ANTOINE RIVER
ANTOINE
OKOL
BEIRNE
LITTLE MISSOURI
NORTH
MILES
4
2
0
2
4
6
8
8
8
6
2
5
4
2
3
5
9
6

Figure 1, page 1

CLARK COUNTY SOILS MAP LEGEND (cont'd)

6 **OUACHITA-AMY ASSOCIATION:** Deep, moderately slowly and slowly permeable, well and poorly drained, acid loamy soils on bottomlands. Ouachita 30%, Amy 30% (inclusions of Chenneby, Leaf, and Kalmia soils and water area 40%). Ouachita soils have dark grayish-brown to brown silt loam surface soil over dark grayish-brown to yellowish-brown silt loam or silty clay loam subsoil. Amy soils have gray or grayish-brown silt loam surface soil over light brownish-gray or gray, mottled silt loam or silty clay loam subsoil. Most of the association is subject to flooding.

▨ **SAFFELL-BLEVINS ASSOCIATION:** Deep, moderately permeable, well drained, acid, loamy soils on nearly level and gently sloping hilltops and ridges on rolling coastal plain uplands. Saffell 40%, Blevins 35% (inclusions of Cahaba, Savannah and Amy 25%). Saffell soils have brown gravelly sandy loam surface soil over brown to red gravelly sandy clay loam subsoil. Blevins soils have dark grayish-brown or brown loam or fine sandy loam surface soil over yellowish-brown or strong brown loam, sandy clay loam or silty clay loam subsoil.

▨ **SHERWOOD-PICKENS ASSOCIATION:** Moderately deep and shallow, moderately permeable, well and somewhat excessively drained, acid, loamy soils on gently sloping to steep hilltops and ridges in the Ouachita Mountains. Sherwood 40%, Pickens 40% (inclusions of Carnasaw, Pirum, Toine and Rock land 20%). Sherwood soils are 30 to 60 inches thick over tilted and fractured sandstone bedrock. They have grayish-brown sandy loam surface soil that is gravelly or stony in some areas, over yellowish-red and red sandy clay loam subsoil. Pickens soils are 10 to 20 inches thick over tilted and fractured sandstone or shale bedrock. They have grayish-brown shaly or stony silt loam or sandy loam surface soil over yellowish-brown shaly or stony fine sandy loam to silty clay loam subsoil.

▨ **TIAK-MAYHEW ASSOCIATION:** Deep, slowly and very slowly permeable, moderately well and poorly drained, acid, clayey soils on nearly level to gently sloping, rolling coastal plain uplands. Tiak 50%, Mayhew 35% (inclusions of Sacul and Sawyer 15%). Tiak soils have grayish-brown or dark grayish-brown silt loam surface soil over yellowish-red or red clay subsoil, mottled gray and yellowish-brown in the lower part. Mayhew soils have grayish-brown silt loam or silty clay loam surface soil over gray, mottled clay subsoil.

Fifteen per cent is pasture land, six per cent cropland, and approximately four per cent towns and roads.

Clark County can be described as a rural county that has a good balance between agriculture and industry. The primary agricultural products produced in the County are timber, soybeans, and some cotton.

At present, the County has the following industries: (1) an aluminum ingot and reduction plant of the Reynolds Metal Company, and (2) a division of the National Gypsum Company engaged in the manufacture of roof deck materials of wood fiber, (3) Ouachita Marine and Industrial Corporation which produces aluminum fishing and pleasure boats, (4) General Marine which also produces fishing and pleasure boats, (5) a division of Munsingwear, Hollywood-Vassarette, which creates ladies lingeries, and (6) Oberman Manufacturing Company, which makes wearing apparel for both men and women.

DeGray Dam, completed in 1969, will impound 13,400 acres of surface water when full. Sportsmen and pleasure seekers attracted to the lake just seven miles from Arkadelphia will undoubtedly add to the solid waste burden in the County.

Arkadelphia is the home town for two four-year institutions of higher learning. Henderson State College has an enrollment of some 2,900 students. Ouachita Baptist University is a Southern Baptist co-educational institution and has an enrollment of approximately 1,200 students.

Project Objectives

The primary goal to which Clark County aspires is a comprehensive, economically feasible, and physically workable solid waste management program for the total geographic area of Clark County.

The project objectives through which the above goal will be achieved, are as follows:

1. To establish an organizational framework to implement and manage and solid waste management program.
2. To provide a rural collection service for unincorporated communities using a system of four cubic yard containers and compactor truck.
3. By using the same container collection system, provide temporary storage space and refuse transportation for incorporated communities with population less than 5,500.
4. To provide a land disposal facility for solid wastes generated in Clark County which will be operated within guidelines established by the State of Arkansas and the Environmental Protection Agency.
5. To collect, organize, report and public data and case history development which will be useful as management information for application to situations on a state and national level.
6. To organize and carry out a public information program on the local, state, and national level.

SYSTEM DESIGN

Introduction

All elements of the solid waste management plan were selected for their minimum economic burden as much as was practical, yet provide a collection and disposal service which would be environmentally acceptable and which would be available to all citizens of Clark County. This management plan required total inter-governmental participation and cooperation in every area of waste management.

System Concept

The system concept was based upon the premise that a centrally located sanitary landfill for the entire county was the most economical means of final and environmentally acceptable disposal. "Environmentally acceptable" disposal is (1) a means of disposing of refuse in such a manner as not to create nuisances, either visual or physical, to public health or safety, and (2) an alternative to promiscuous dumping and burning.

Methods of reduction and recycling were considered as possible solutions to the refuse problems in Clark County. These included compost plants, pulverizers, and incinerators. These methods were not considered to be feasible at this time for the following reasons:

(1) The relatively small quantity of refuse expected to be generated in Clark County is not great enough to justify composting or pulverizing.

(2) The high costs of incineration is prohibitive.

(3) Land area is not a critical factor in Clark County.

The method of disposal selected for use was a sanitary landfill, to be operated by the County government to provide regional jurisdiction of use. It was envisioned as a facility to serve all political subdivision within Clark County boundaries.

Refuse is presently being collected in the following manner:

(1) County government operates a rural collection system. Rural collection is accomplished by utilizing a container system serviced by a large compactor truck. Containers have been placed at points in the rural County where dictated by population concentrations and transportation routes.

(2) The small incorporated areas of the County have contracted with the County for collection and transfer of refuse to the central landfill. The storage system

consists of containers dispersed throughout the town, which are used by the townspeople for temporary storage. These storage units are serviced by the County compactor truck.

(3) Arkadelphia presently manages and operates a municipal collection system. Under this method of collection, the city operates a collection service by a sanitation department to provide collection service to all residential, commercial, institutional, and industrial accounts within incorporated limits. Arkadelphia's collection trucks haul city refuse to the sanitary landfill.

(4) For industrial and commercial areas outside incorporated limits, arrangements have been made and will continue to be made as businesses desire the service, for contractual services between the County and these business establishments.

(5) Provisions have been made for the Corps of Engineers and The State Park Department to utilize the Clark County Sanitary Landfill for disposing of refuse generated around the perimeter of DeGray Lake. Present contractual arrangements with the Corps dictate that they will pay for disposal services and will have responsibility for collection and hauling of DeGray refuse and for its transportation to the disposal site.

Solid Waste Collection Design

The design of the collection system is presented herein as a four part design. The four parts are as follows: (1) rural collection service, (2) special and bulk items collection service, (3) rural incorporated collection service, and (4) urban collection service.

The rural collection service provides for refuse collection in two major areas, rural Clark County and all incorporated areas with the exception of Arkadelphia. Each cog in the wheel of the Coordinated City-County Solid Waste Collection System is discussed in the following sections.

Rural Collection System

Rural collection service is accomplished through utilization of a compactor truck and container system.* The containers have been located primarily at traffic nodes along rural roads. The purpose of these container-locations is to put every household in the rural areas closer to a refuse container than to one of the existing, open dumps. These containers will eventually eliminate the necessity for an individual to haul trash to the sanitary landfill. This will help to reduce the quantity of trash on highway rights-of-way as a result of blowing out of open-bed trucks.

---

*This container collection system follows the format established by the Chilton County, Alabama Demonstration Project.

The computations used to determine container capacity and number of containers needed is summarized in Table 3. A refuse factor of 2.0 lbs. per person per day was used for container requirement computation and is compatible with data obtained from the Chilton County, Alabama experience.

The rural segment of the collection system was estimated to a minimum of sixty containers having a capacity of 4 cubic yards. There were business and commercial establishments in the rural area which were known to desire preferential service, increasing the number of containers needed by approximately ten containers. A contingency reserve of ten containers was included to allow for possible unforeseen needs.

To determine the location of the solid waste units and collection routes, a five step procedure was developed. The first two phases identify the area of the county to be served, phases three and four pertain to the location of the waste units while the last phase has to do with route selection.

The first phase in determining the location of the solid waste units was to delineate those areas of the county that would not require this service (Figure 2).

Table 3. CONTAINER REQUIREMENTS - RURAL COLLECTION SYSTEM

	Population	lb/person/ day*	Total lbs/day	lbs/day 300 lbs yd^3	Days Storage	Needed Capacity	Number of 4 yd^3 Containers
Amity	614	2.0	1,228.0	4 yd^3	3	12 yd^3	3
Okolona	233	2.0	466.0	1.5 yd^3	3	4.5 yd^3	1
Whelen Springs	126	2.0	252.0	.8 yd^3	3	2.4 yd^3	1
Gum Springs	269	2.0	538.0	1.8 yd^3	3	5.4 yd^3	2
Gurdon	2,075	2.0	4,150.0	13.8 yd^3	3	41.4 yd^3	11
Rural	8,385	2.0	16,770.0	55.9 yd^3	3	167.1 yd^3	42
Container Needs - Rural Household							60
Business & Commercial - Rural Preferential Service							10
Add Contingency Reserve							10
TOTAL CONTAINER NEEDS							80

*Source: Chilton County Solid Waste Disposal Demonstration Project Detailed Progress Report, April, 1971.

This was accomplished by an analysis of the Clark County road map, which was compiled by the State Highway Department. Plotted on the map for each section are the occupied and unoccupied farm dwellings in the county.

After the unoccupied sections were identified, the second phase of the procedure was to count the occupied structures for each section and record this data on the county road map. Sections were used for the basic grid because they were present on the map.

The number of occupied structures in each section was then multiplied by four, the average number of residents per household in the county. The values thus derived were plotted on the county map, and it was used to identify the major rural population concentrations. At these points, the first series of containers were planned.

The next phase was to identify the area served by each solid waste container. This was accomplished by summing the population figures of the sections surrounding these points. When a total of 200 people were obtained, the collection area for that container was delineated and considered closed (Figure 3). A value of 200 people for each container was calculated on the basis of 2 lbs. of solid waste per person per day. If a factor of 200 lbs. per cubic yard of uncompacted waste is used, then waste quantity will convert to

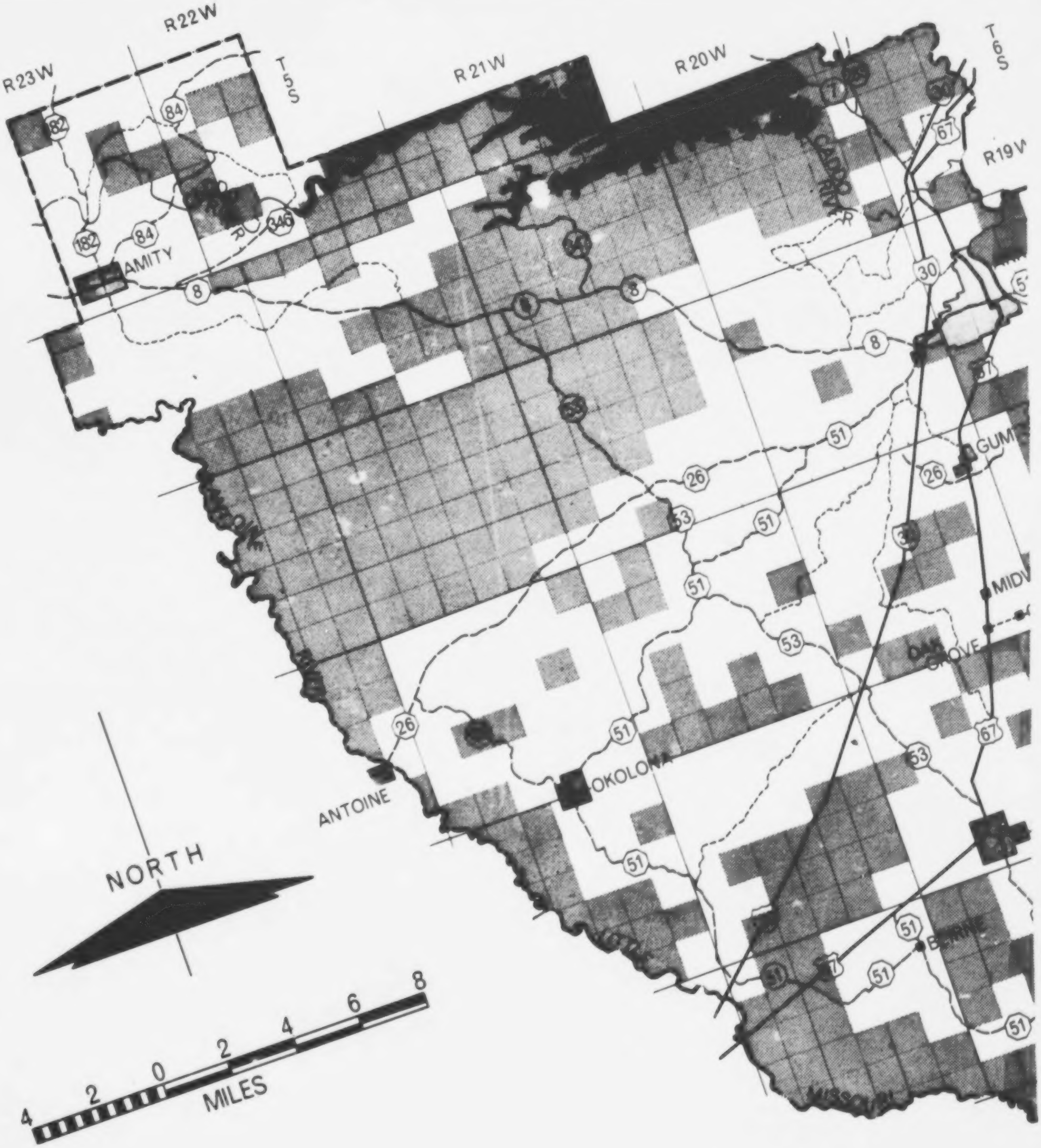
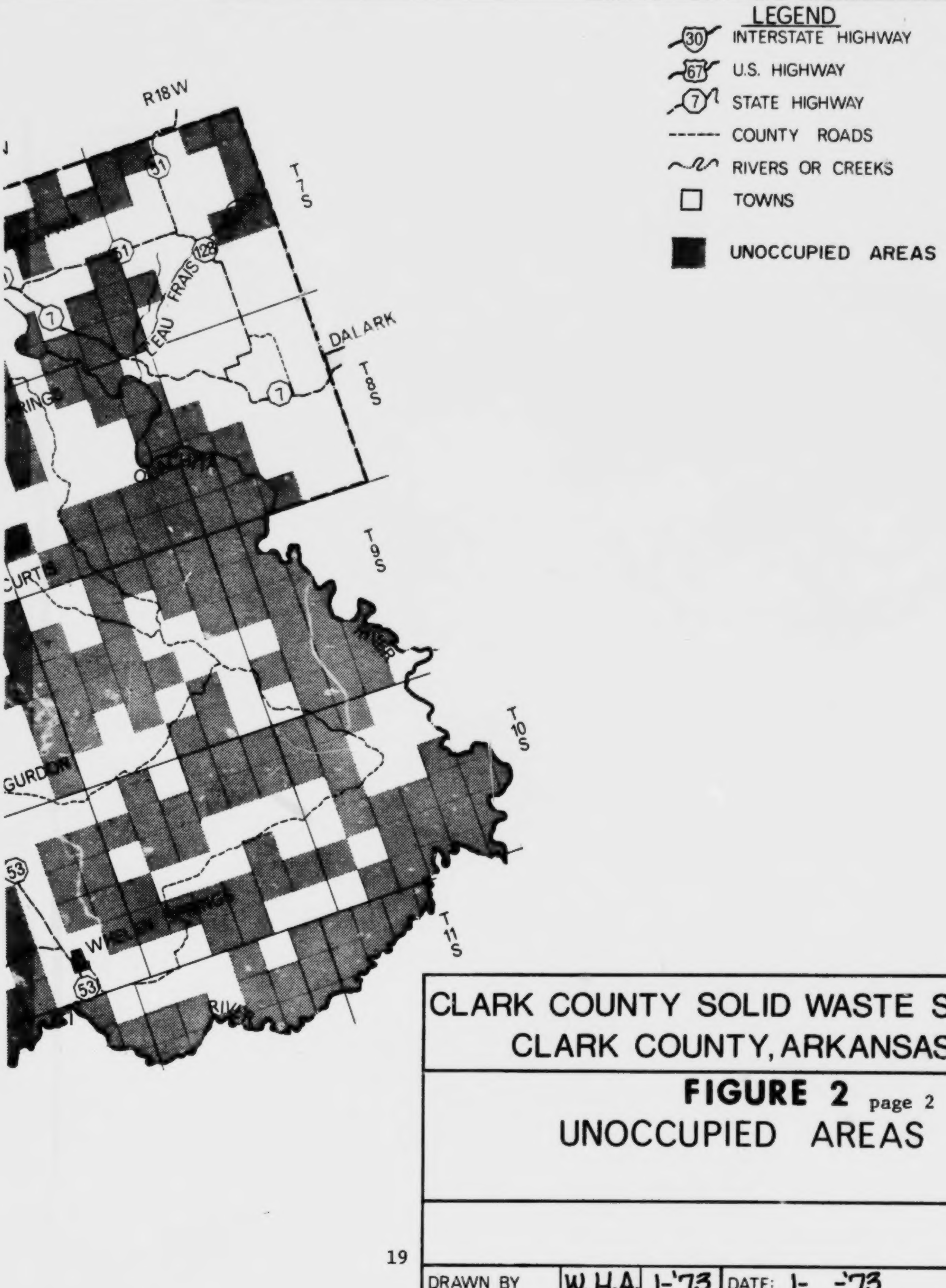

R22W
R23W
T5S
R21W
R20W
T6S
R19W
CADDO RIVER
AMITY
OKOLONA
ANTOINE
GUM
MIDW
OAK GROVE
BEIRNE
MISSOURI
NORTH
4
2
0
2
4
6
8
MILES
182
84
346
8
30
67
7
51
26
53

Figure 2, page 1


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
------ COUNTY ROADS
RIVERS OR CREEKS
☐ TOWNS
■ UNOCCUPIED AREAS
R18W
T 7 S
T 8 S
T 9 S
T 10 S
T 11 S
51
128
7
53
EAU FRAIS
DALARK
OKOLONA
CURTIS
GURDON
WHELEN SPRINGS
RIVER

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIGURE 2 page 2
UNOCCUPIED AREAS

DRAWN BY	W. H.A.	1-'73	DATE: 1- -'73	
CHECKED BY		1-'73	SCALE: 1"=4 MILES	
APPROVED BY		1-'73	SHEET 1 OF 1	

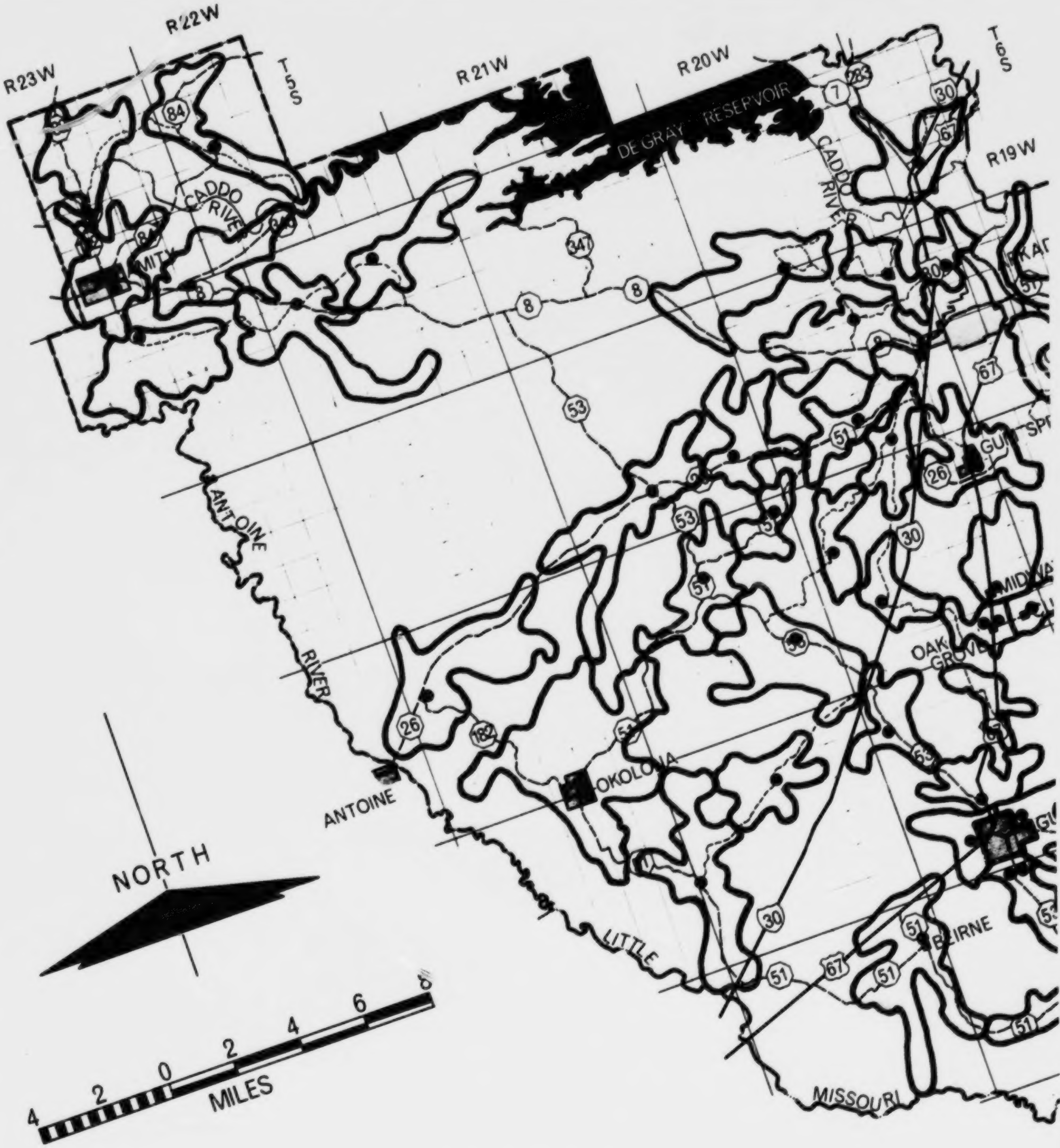
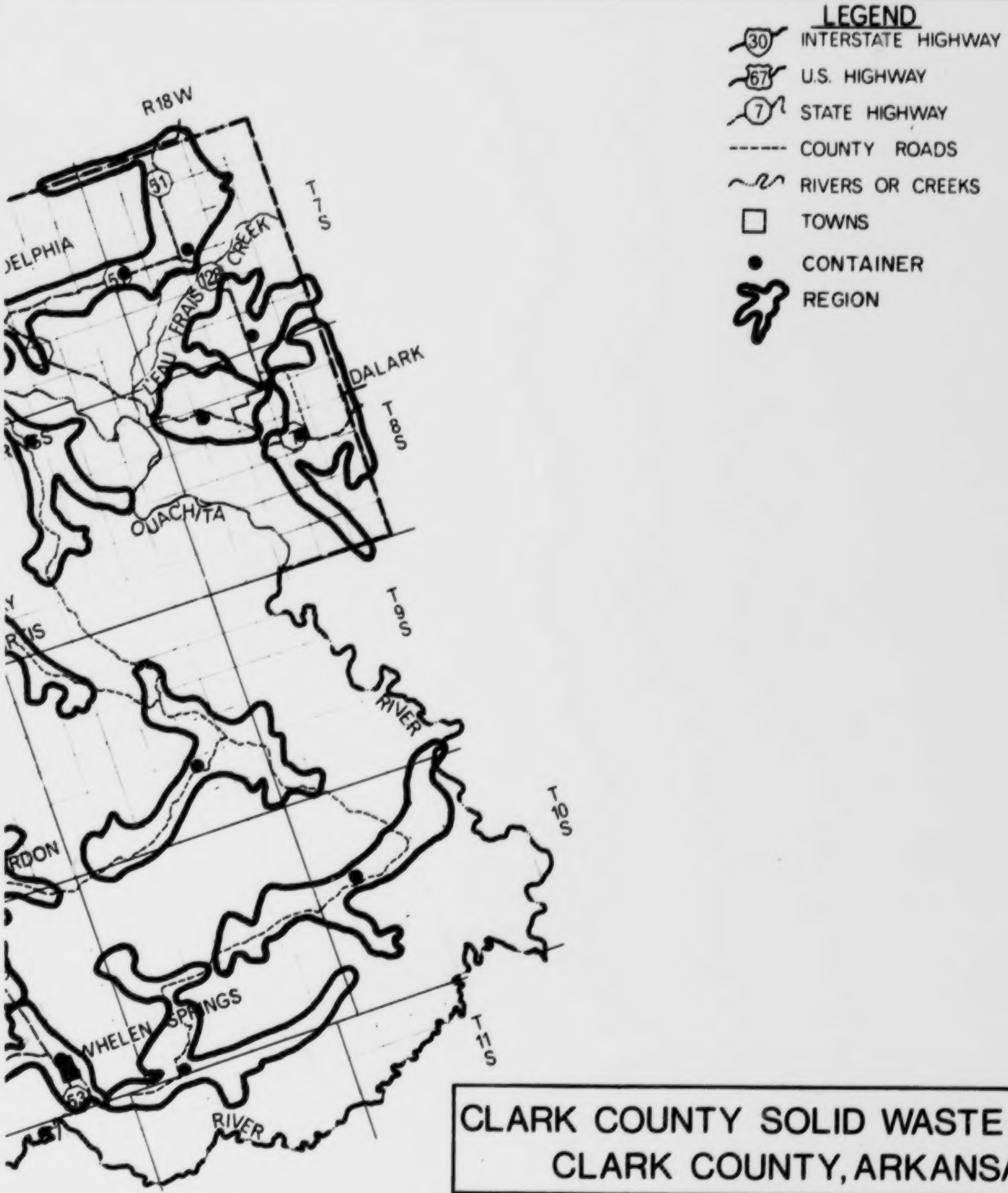

R23W
R22W
R21W
R20W
R19W
T 5 S
T 6 S
DE GRAY RESERVOIR
CADDO RIVER
CADDO RIVER
AMITY
ANTOINE RIVER
ANTOINE
OKOLONA
GUM SPR
MIDWA
OAK GROVE
BEIRNE
LITTLE MISSOURI
NORTH
MILES
4
2
0
2
4
6
8

Figure 3, page 1


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
COUNTY ROADS
RIVERS OR CREEKS
TOWNS
CONTAINER
REGION
R18W
T7S
T8S
T9S
T10S
T11S
51
128
ELPHIA
L'EAU FRAIS CREEK
DALARK
OUACHITA
RIVER
RDON
WHELEN SPRINGS
53
67

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIGURE 3 page 2

CONTAINER LOCATIONS

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container capacity per service areas as follows:

A. 200 people X 2.0 lbs/person/day = 400 lbs/day

B. 400 lbs/day X 3.0 days = 1,200 lbs/3 day period

C. 1,200 lbs/3 day period ÷ 300 lbs/yd^3 = 4.0 yd^3 capacity needed.

Therefore, one container with four cubic yard capacity will service each area for a three day period between unloadings.*

The next procedure was to ascertain the most strategic location to place containers which would serve each group of 200 people. This was accomplished by utilizing a process based on the concept of intervening opportunity, in which the container is located relative to the population distribution and the distance of that distribution to the other containers in the area. Here again the figure of 200 was used, although in many instances it was found that the population density and distribution was such that lower totals were delineated. Thus, the container is so located within the area delineated that it is closer to all dwellings in the region than they are to any other container.

---

*The value of 300 lbs. per cubic yard of uncompacted waste was based upon a combination of an implementation study done by the Texas Agricultural Extension Service for Polk County, Texas and informal averages found to be in force in several projects over the United States. These averages ranged from 125 lbs. per cubic yard to 450 lbs. per cubic yard. Actual experience in Clark County since these planning calculations were made indicates that a more valid value for calculating container requirements is from 175 lbs. to 225 lbs. per cubic yard.

Once the locations for the solid waste containers were chosen, the design of the collection system was undertaken (Figures 4, 5, & 6). From its conception, four factors were kept in mind: the capacity of the compactor truck, the location of the sanitary landfill, the geometrical shape of the routes, and the orientation of the road patterns in the county. Each of these factors played an equally important role in determing which container would be connected to which route.

With these factors in mind, the objective was to design a collection system with as few routes as possible and the least number of trips to the landfill. Eight sub-routes were designed in all, the longest is less than 75 miles and the shortest not less than 10 miles. Each is circular in nature and collects an average of 7.6 containers.

The proposed container locations and the rural collection routes as derived by the above methodology are shown in Figure 4, 5, & 6. There are eight rural collection sub-routes. For maximum collection efficiency, the eight sub-routes were grouped into three major collection routes. Each major route will require a full day to be serviced and for the collection truck to return to the landfill. Table 4 shows the groupings of sub-routes into the major collection routes and the weekly collection schedule that these routes will require.

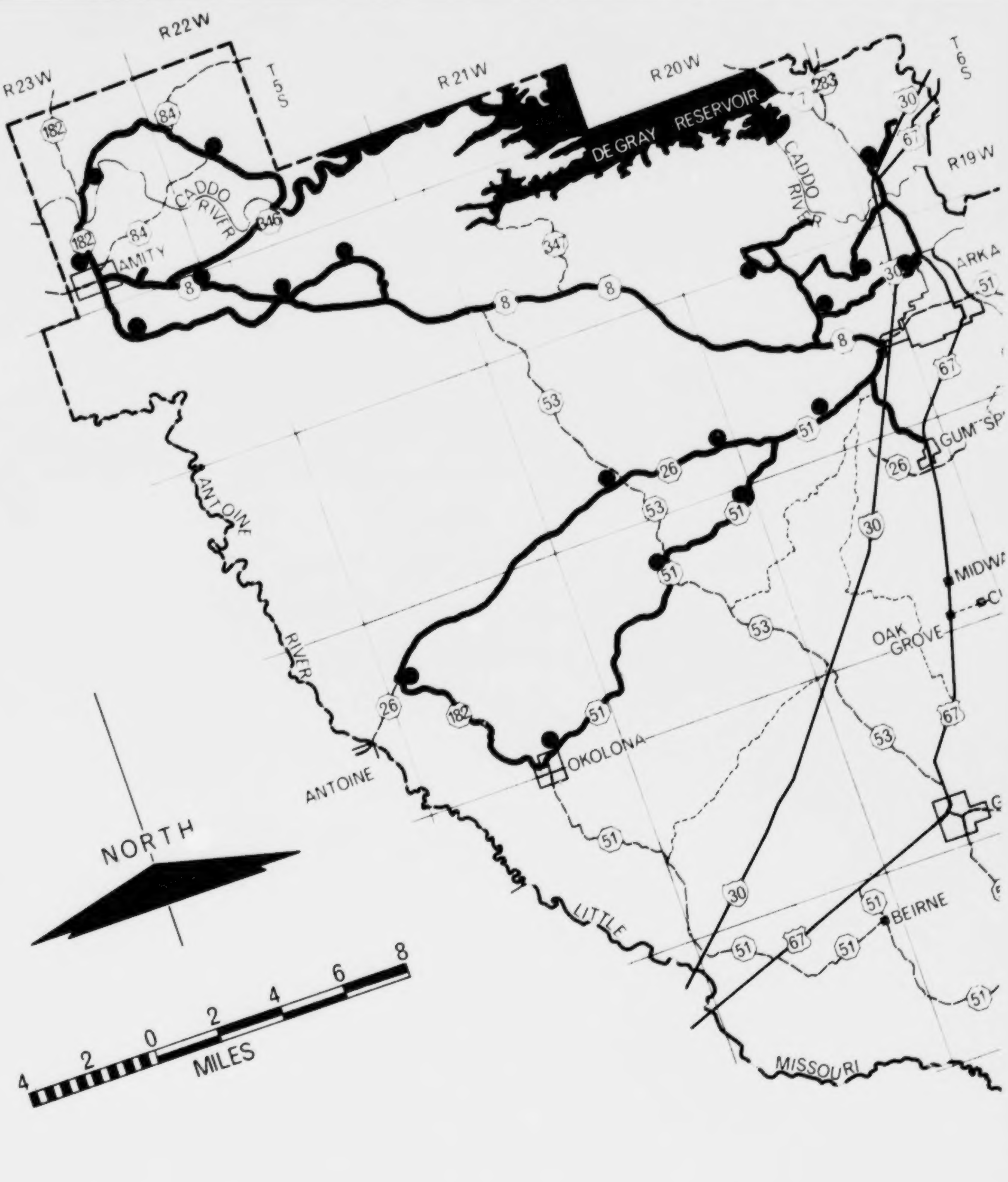
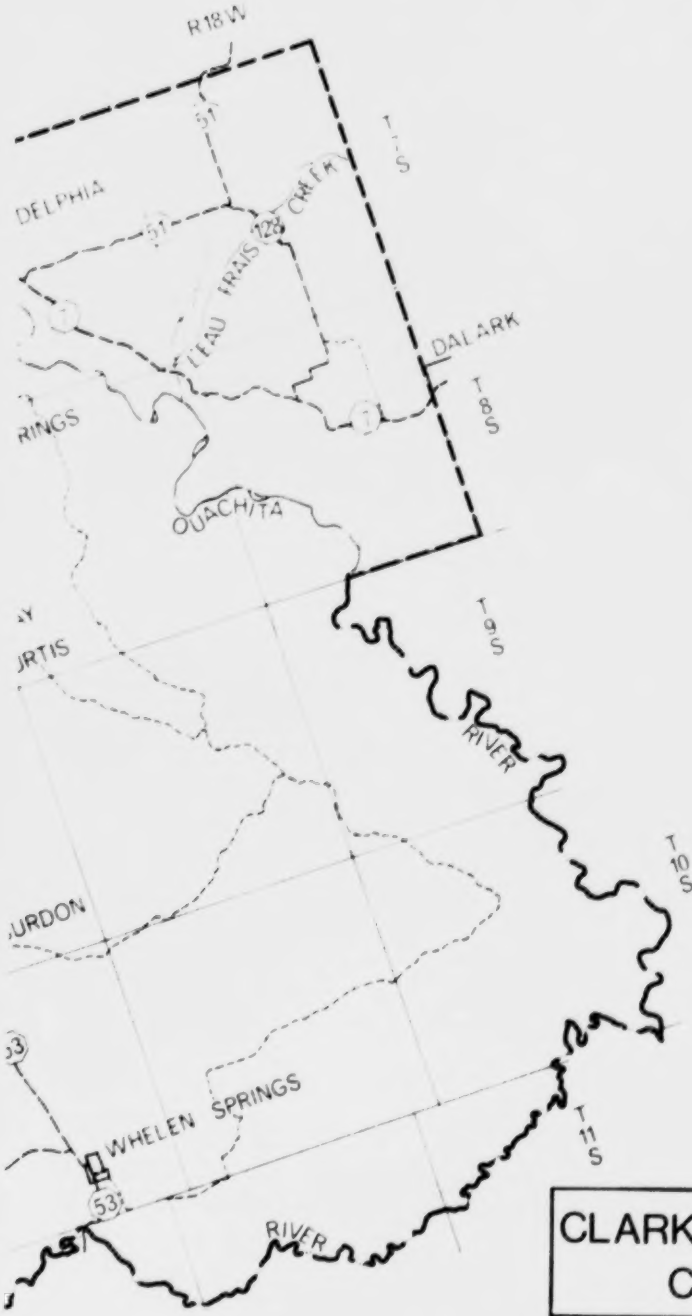

R22W
R23W
T 5 S
R21W
R20W
T 6 S
R19W
283
30
67
DE GRAY RESERVOIR
CADDO RIVER
CADDO RIVER
182
84
846
AMITY
347
8
ARKA
51
53
26
GUM SP
MIDWA
OAK GROVE
ANTOINE RIVER
ANTOINE
OKOLONA
LITTLE MISSOURI
BEIRNE
NORTH
8
6
4
2
0
2
4
MILES

Figure 4, page 1

LEGEND

- 30 INTERSTATE HIGHWAY
- 67 US HIGHWAY
- 7 STATE HIGHWAY
- ------ COUNTY ROADS
- RIVERS OR CREEKS
- ☐ TOWNS
- ● CONTAINER LOCATIONS


R18W
T7S
DELPHIA
51
51
128
L'EAU FRAIS CREEK
7
DALARK
T8S
RINGS
7
OUACHITA
T9S
RIVER
RTIS
T10S
URDON
53
WHELEN SPRINGS
53
T11S
RIVER

NOTE: DOES NOT INCLUDE NUMBER & LOCATION OF CONTAINERS WITHIN MUNICIPALITIES.

ROUTES DENOTES ONE DAY'S COLLECTION.

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIG 4. RURAL COLLECTION ROUTES 1,2 & 3
page 2

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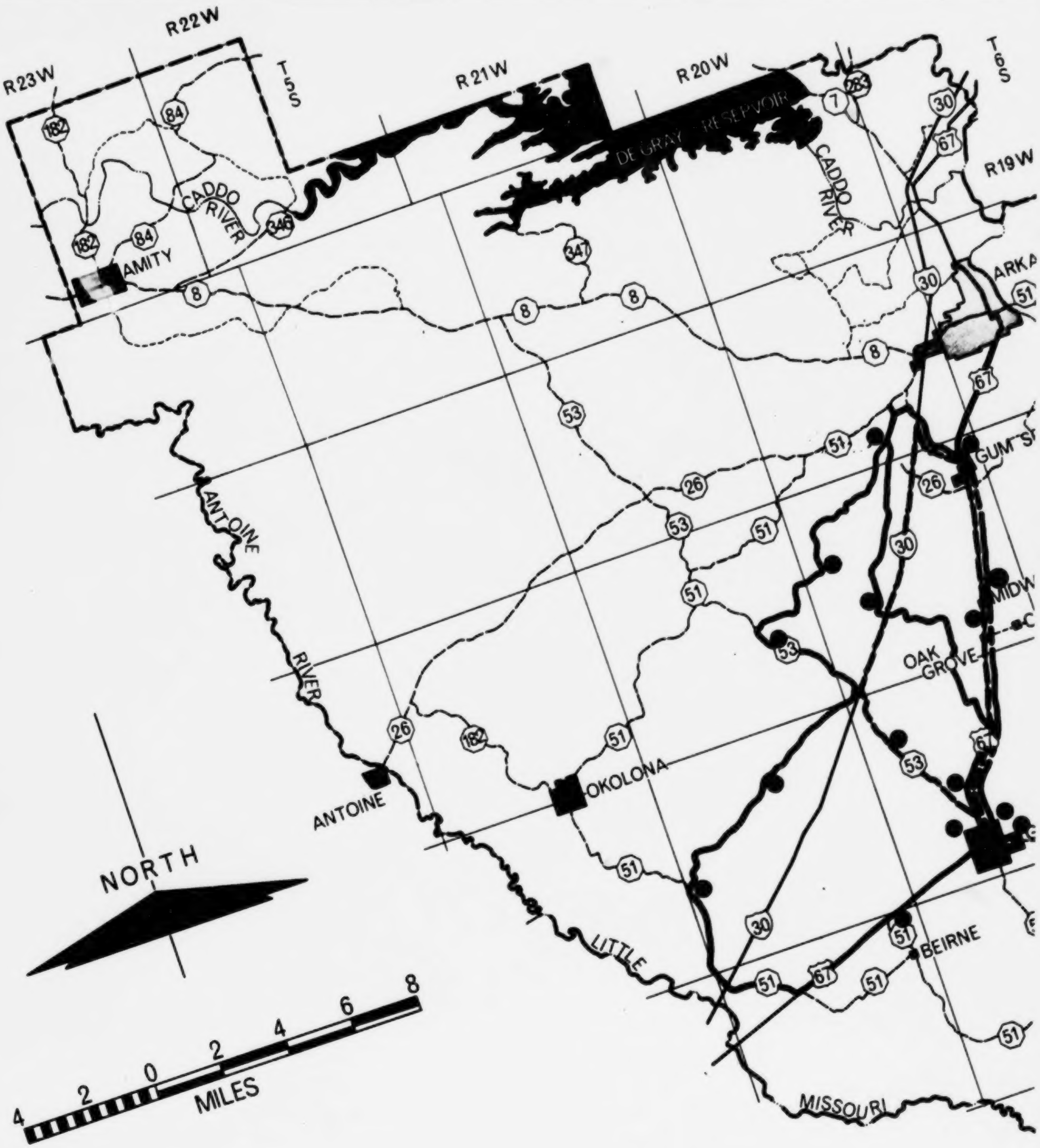
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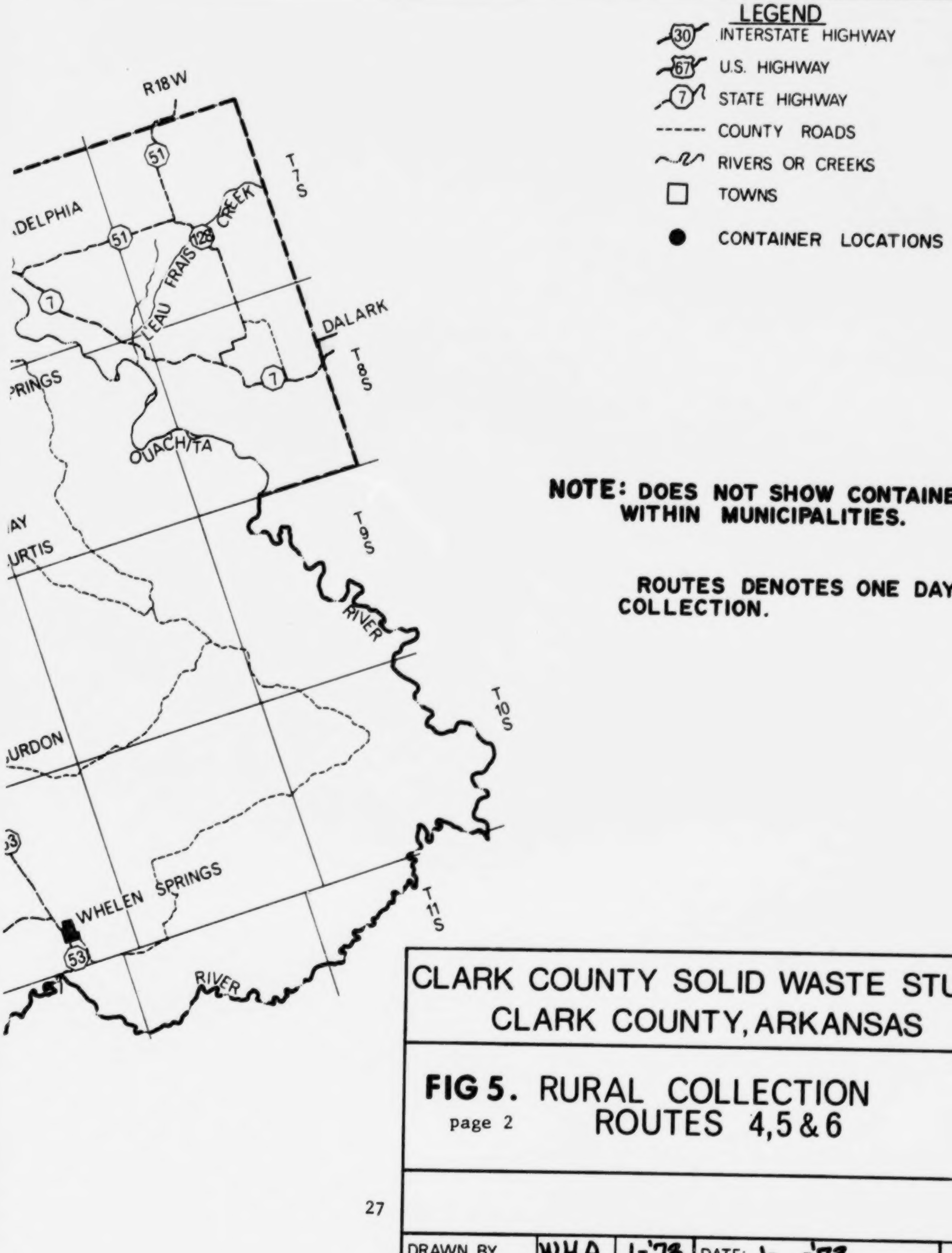
R19W
DE GRAY RESERVOIR
CADDO RIVER
CADDO RIVER
AMITY
ARKA
GUM SP
MIDW
OAK GROVE
OKOLONA
ANTOINE
ANTOINE RIVER
LITTLE MISSOURI
BEIRNE
NORTH
MILES
4
2
0
2
4
6
8
182
84
346
347
7
283
30
67
8
51
53
26

Figure 5, page 1


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
COUNTY ROADS
RIVERS OR CREEKS
□ TOWNS
● CONTAINER LOCATIONS
R18W
T7S
T8S
T9S
T10S
T11S
51
128
7
53
67
DELPHIA
L'EAU FRAIS CREEK
DALARK
PRINGS
OUACHITA
RIVER
AY
URTIS
URDON
WHELEN SPRINGS
RIVER

NOTE: DOES NOT SHOW CONTAINERS WITHIN MUNICIPALITIES.

ROUTES DENOTES ONE DAY'S COLLECTION.

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIG 5. RURAL COLLECTION ROUTES 4,5 & 6
page 2

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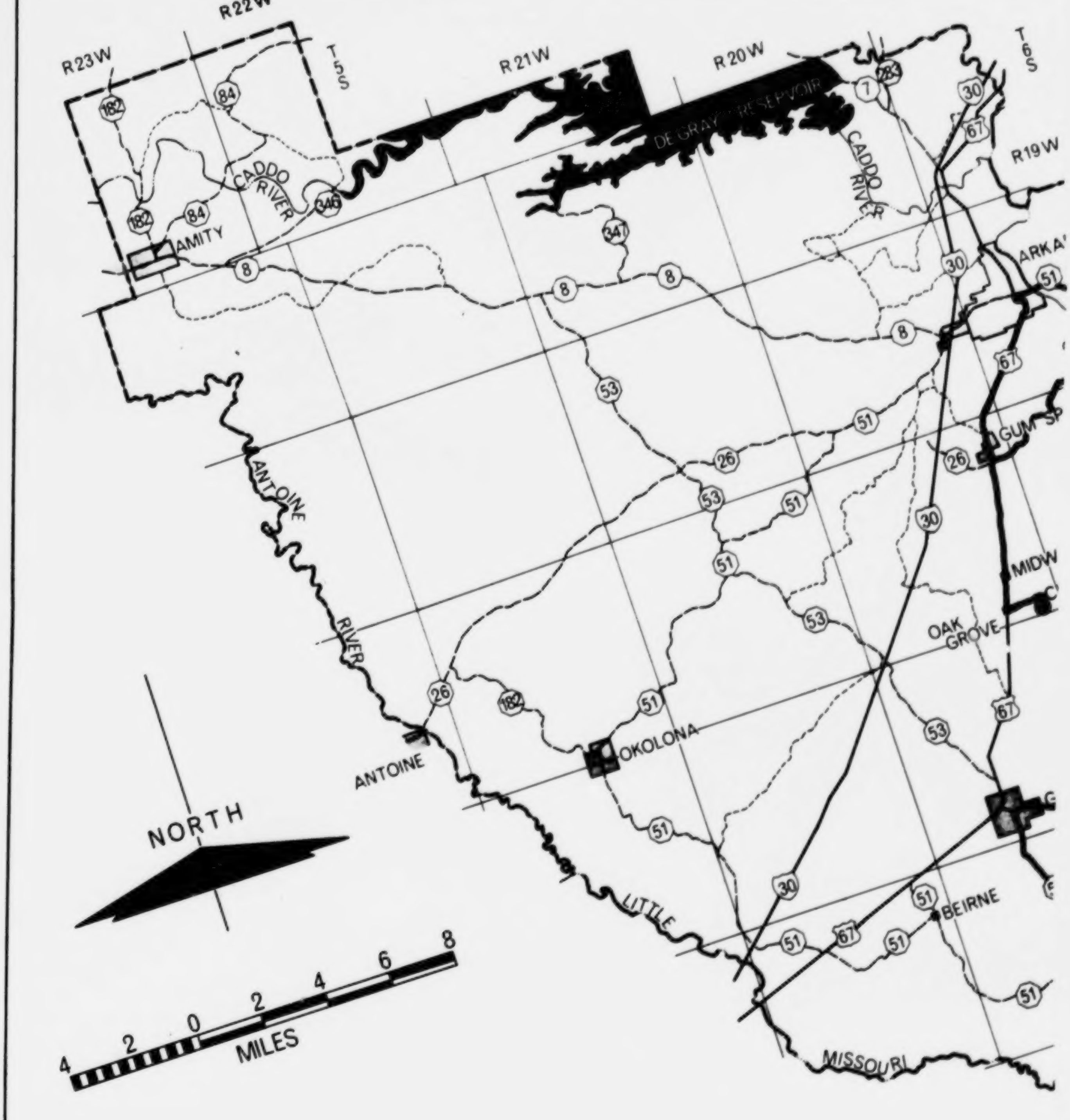
R22W
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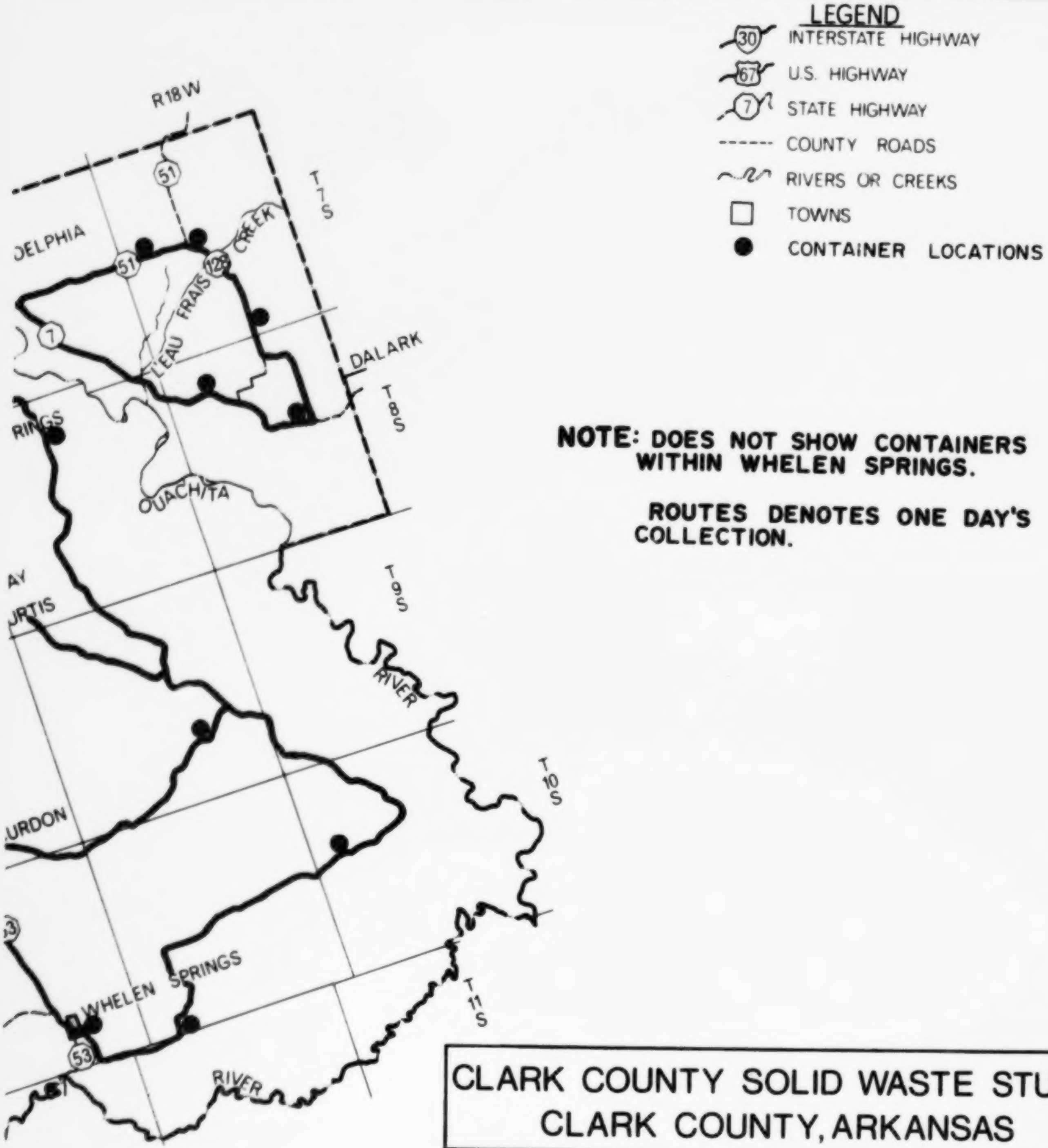
R20W
T6S
R19W
182
84
CADDO RIVER
346
AMITY
8
347
DE GRAY RESERVOIR
7
283
30
67
CADDO RIVER
ARKA
51
53
GUM SP
26
ANTOINE RIVER
MIDW
OAK GROVE
26
182
51
OKOLONA
ANTOINE
NORTH
LITTLE
MISSOURI
BEIRNE
4 2 0 2 4 6 8
MILES

Figure 6, page 1


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
COUNTY ROADS
RIVERS OR CREEKS
☐ TOWNS
● CONTAINER LOCATIONS
R18W
51
T7S
DELPHIA
51
128
L'EAU FRAIS CREEK
7
DALARK
T8S
RINGS
OUACHITA
AY
URTIS
T9S
RIVER
T10S
URDON
53
WHELEN SPRINGS
T11S
53
67
RIVER

NOTE: DOES NOT SHOW CONTAINERS WITHIN WHELEN SPRINGS.

ROUTES DENOTES ONE DAY'S COLLECTION.

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIG 6. RURAL COLLECTION ROUTES 7&8
page 2

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Table 4. RURAL COLLECTION SCHEDULE

Time	Route	Mileage	Mileage Sub-Total	Number of Containers	Cubic Yardage Collected
1st Day	Amity	66.3		7	28
	Amity City			4	16
	Okolona	48.7		7	28
	Okolona City			2	8
	DeGray	23.4		5	20
	Landfill Round Trip	20	158.4	25	100
2nd Day	Gurdon I	34.3		7	28
	Beirne	55.4		8	32
	Gurdon II	34.3		11	44
	Landfill Round Trip	20	144.0	26	104
3rd Day	Whelen Springs	75.6		7	28
	Whelen Springs City			2	8
	Griffithtown	30.4		5	20
	Landfill Round trip	20	126.0	14	56
4th Day	Amity	66.3		7	28
	Amity City			4	16
	Okolona	48.7		7	28
	Okolona City			2	8
	DeGray	23.4		5	20
	Landfill Round Trip	20	158.4	25	100
5th Day	Gurdon I	34.3		7	28
	Beirne	55.4		8	32
	Gurdon II	34.3		11	44
	Landfill Round Trip	20	144.0	26	104
6th Day	Whelen Springs	75.6		7	28
	Whelen Springs City			2	8
	Griffithtown	30.4		5	20
	Landfill Round Trip	20	126.00	14	56
TOTAL PER WEEK			856.8	130	520

In establishing the major routing system, consideration was given to mileage and truck capacity. The maximum round-trip distance of 158.4 miles is well within the truck's range for a one day haul. The maximum number of containers in a given major route is also within the 30 cubic yard capacity of the compactor truck. Each route will be serviced a minimum of twice weekly. This operation can be handled on a six day per week collection operation.

Initial container requirements are estimated to be 80 containers. The service truck for the rural collection system will be a 30 cubic yard compactor truck with a front loader capability.

Only one full-time position is necessary for the rural collection system. This position will be the compactor truck driver. The landfill manager/dozer operator and the alternate heavy equipment operator will be cross-trained as back-up personnel.

Special and Bulk Item Collection Service

This plan is unique in that it provides a means for collection of bulk waste items such as car bodies, T. V. sets, appliances, and furniture. With a means for locating collecting and transporting bulk items to the disposal site, Clark County can stimulate the disappearance of a great proportion of "junk". Emphasis on bulk items will rid Clark County of much junk material already abandoned and will give the county the capability of adequate and responsive collection and disposal of those items as they normally go out of service.

The operational plan is simple but can be very effective. The County will own and operate a bulk collection vehicle which will be available on call by either interested citizens and/or city councils. The bulk collection vehicle will be operated by the alternate heavy equipment operator and will not necessitate addition of an extra employee. Bulk collection can be accomplished with a stake and platform truck modified with boom and hoist for lifting bulk items.

The bulk collection truck will be used also as a vehicle for servicing container sites. A steam generator will be a part of vehicle equipment. The steam generator will be used in periodic cleaning of waste containers.

Rural Incorporated Collection Service

Smaller towns, such as Amity, Okolona, Whelen Springs, and Gum Springs, cannot individually afford compliance with the intent of Acts 237 and 238 of the 1971 legislature. However, if each participates in concert by being a part of the County collection and disposal service, the solution becomes reasonable in terms of economics.

The most ecoonomical and environmentally acceptable means of collection from small towns is through use of a containerized storage and transfer system. Each town has located within its incorporated limits a number of containers which are being used by the town for dumping and temporary storage. These containers are being serviced during the regular rural collection route on a three time per week basis.

Equipment - The only equipment requirements for the rural incorporated transfer station are the containers. Table 3 summarizes the expected quantities of refuse and number and sizes of containers required by each town.

Responsibility for providing house-to-house collection service will rest with each City Government. Regardless of whether the refuse is collected by private hauler licensed by the city, or carried by the individual homeowner, the transfer station concept, as outlined in this section, provides Clark County with an effective, economical alternative to the present practice of open dumping and incidental littering of City streets and County roads.

Urban Collection Service

The only city considered in this plan to be an urban area is Arkadelphia (population 9,841). The City Board has made the decision to initiate and operate a municipal collection system. The major policy decision has been to provide behind the house pick-up service.

Equipment configuration selected for the service was the container train system. The City of Arkadelphia is now serviced by three trains, each with three, 5 cubic yard trailers. One 24 cubic yard packer truck is used to service these trains. One additional 16 cubic yard, front loading compactor is being used to provide pick-up for institutional and commercial establishments.

Under the proposed County-wide management plan, refuse generated within Arkadelphia city boundaries is being transported to the sanitary landfill only by municipal collection vehicles. Initiation of municipal collection operations has virtually eliminated individual hauling from both households and businesses and has therefore decreased the quantities of trash which normally reaches highway rights-of-way when collection is unregulated and uncontrolled.

Sanitary Landfill Design

The plan presented herein is based upon a 20 year projection. Studies have been conducted which give planning agencies a fairly good rule of thumb to determine the amount of land area required for a sanitary landfill. The rule of thumb is that two acres per year, six feet deep, will be required for each 10,000 population.

Clark County has a population of 21,543 so the land area required would be four acres per year if burial can be achieved to a depth of 6 feet. Based on a 20 year plan, the land required will be approximately 80 acres.

Rationale for Site Selection

An analysis of a series of factors, physical and social, was conducted to determine the most suitable location for a sanitary landfill. These factors included soil limitations, topography, flood plains, geology, road systems, population concentrations, haul distances, and land use.

The first proposed site, which was owned by the Corps of Engineers, was analyzed by the Arkansas Pollution Control and Ecology Commission Geologist (See Appendix A). He determined that several aquifers (porous sandstone) surfaced on the proposed site and that to avoid pollution of the underground water table, extensive engineering would have to be accomplished in order to make the site suitable. It was determined that the engineering costs on this site would be prohibitive.

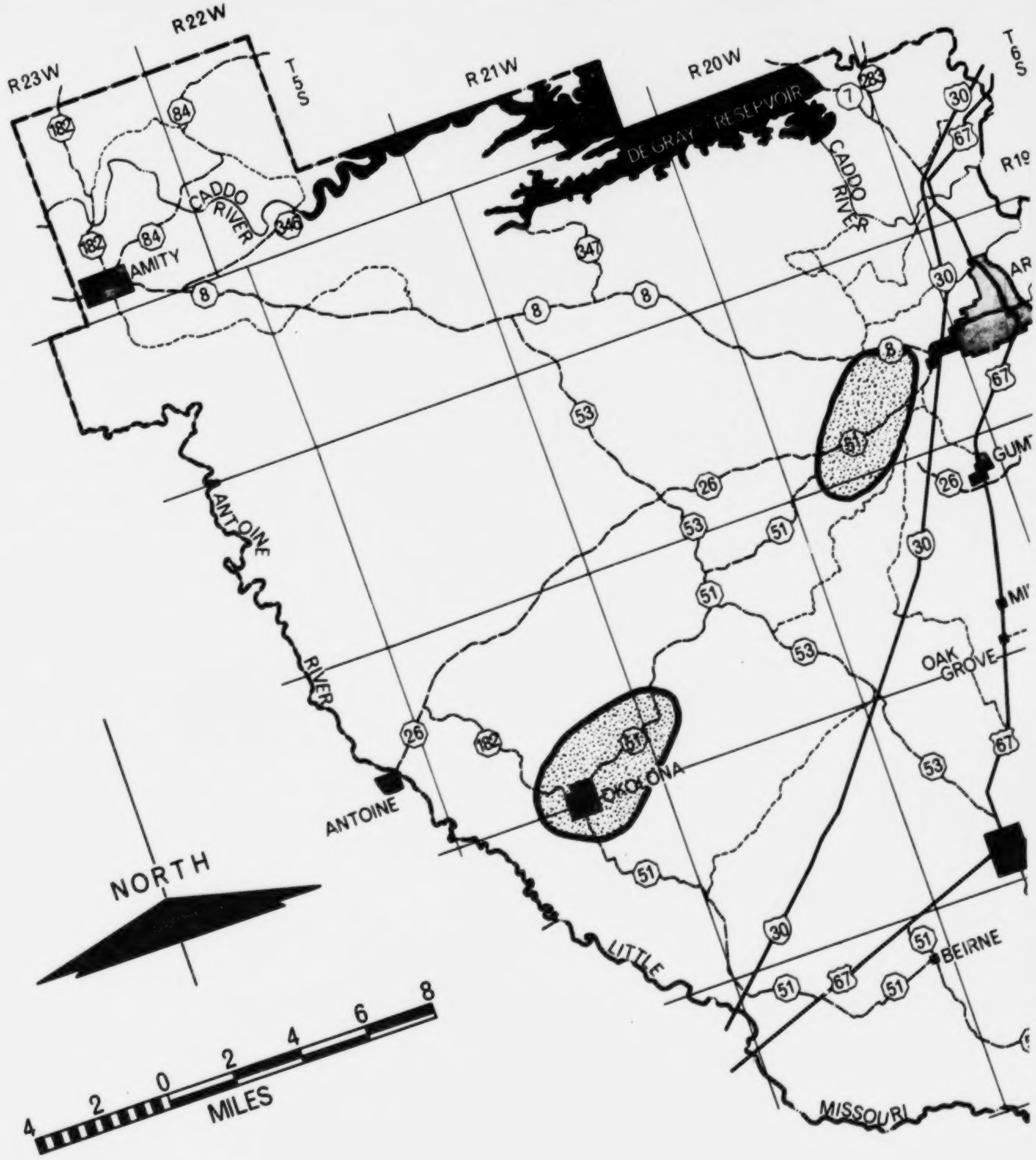
As soon as it was learned that the Corps' property would not be suitable due to geological limitations, a search was immediately begun for a new site. The same geologist that inspected the Corps' site located and delineated on a Clark County map zones within which he suggested a search be confined. These areas are shown in Figure 7. These zones were established due to the fact that the geological formations within these zones are not known to contain aquifers or aquifer recharge areas.

Two zones were eliminated completly due to very inadequate soil for cover material. Soils in these two zones are hard clay with little or no loam content and are extremely difficult to work with a dozer blade. Priorities are then established for the remaining zones as noted in Figure 7. The zone east of the Ouachita River was given a priority of one (most desirable) because of its proximity to the center of greatest refuse production and the existence of land remote from high density population areas.

A search for a specific site in the priority one zone was conducted in cooperation with International Paper Company Soil, Conservation Service, and the Arkansas Department of Pollution Control and Ecology. This search resulted in the designation of a site owned by International Paper Company as the proposed Sanitary Landfill site.

The Clark County Sanitary Landfill is located on a 27.7 acre site that is described as that portion lying south of the existing county road of the Northwest 1/4 of Section 12, Township 7 South, Range 18 West, Clark County, Arkansas. This location is about nine miles east of Arkadelphia, Arkansas by route of Arkansas State Highway 51 to the small community of Joan and then about two miles along county road going northeast to the proposed landfill site (Figure 8).

Adjacent to the 27.7 acre site is an additional 52 acres which can be leased at a future date. Therefore, general engineering work was accomplished to take this additional area into consideration. The first portion (the 27.7 acres) will be the area lying southwest of a ridge which runs southeasterly across the property from the county road, marked Phase I on figure 9. Engineering plans are provided in Figures 9 through 12. The second portion will be that area which lies northeast of the ridge and is marked Phase II on figure 9. International Paper Company also owns all land which is adjacent to this proposed site, with the exception of the property joining the west boundary which is 120 acres in an estate controlled by Mr. J. P. Sturgis.


R22W
R23W
T5S
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R20W
T6S
R19
DE GRAY RESERVOIR
CADDO RIVER
CADDO RIVER
AMITY
ANTOINE RIVER
ANTOINE
OKOLONA
OAK GROVE
BEIRNE
LITTLE MISSOURI
NORTH
4 2 0 2 4 6 8
MILES
182
84
346
347
8
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26
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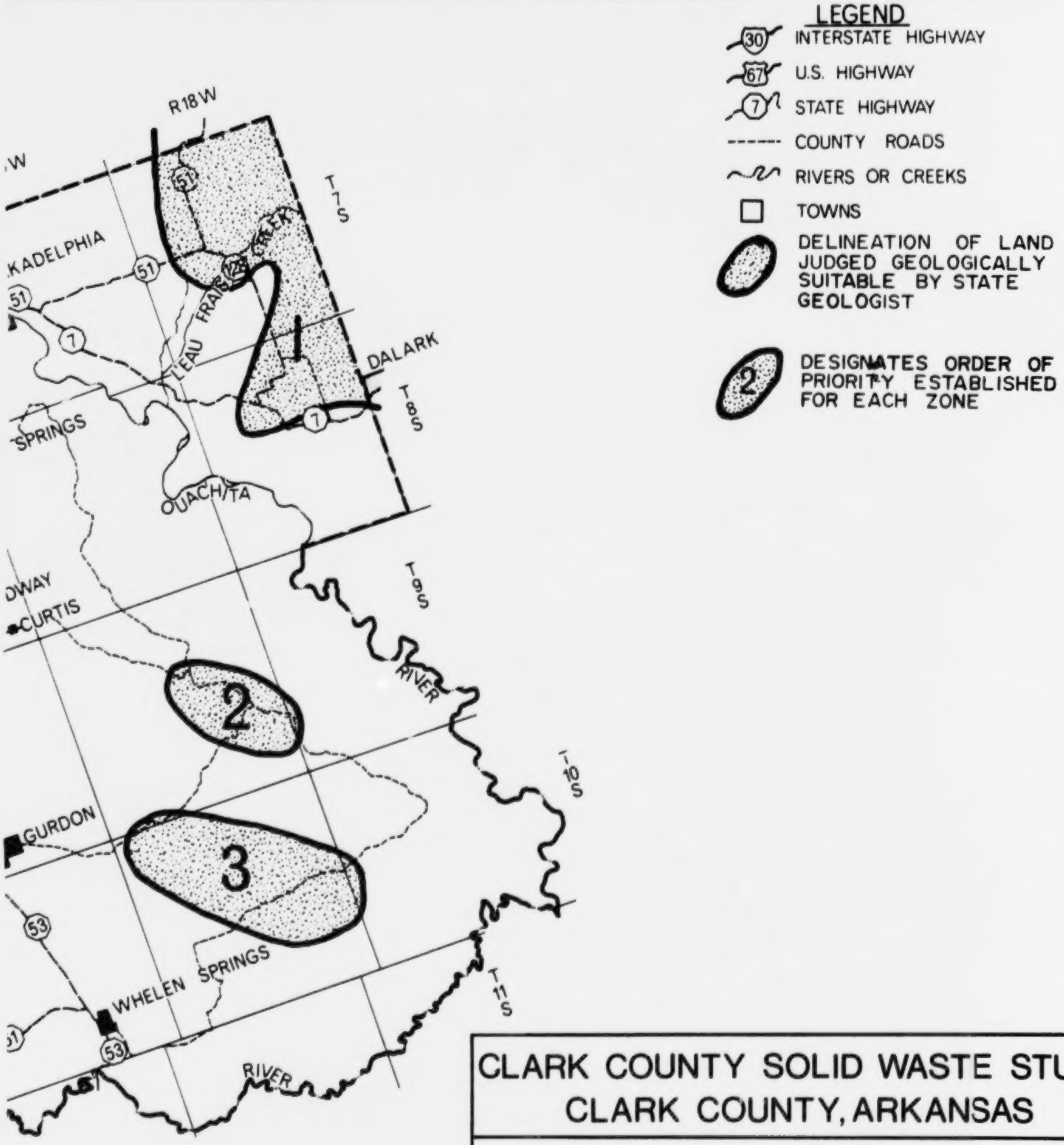
30
67
7
283

Figure 7, page 1


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
COUNTY ROADS
RIVERS OR CREEKS
TOWNS
DELINEATION OF LAND JUDGED GEOLOGICALLY SUITABLE BY STATE GEOLOGIST
2 DESIGNATES ORDER OF PRIORITY ESTABLISHED FOR EACH ZONE
R18W
W
T7S
T8S
T9S
T10S
T11S
KADELPHIA
51
128
7
53
L'EAU FRAIS CREEK
DALARK
SPRINGS
OUACHITA
RIVER
DWAY
CURTIS
GURDON
WHELEN SPRINGS
1
2
3

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIG 7. LOCATIONAL
page 2 ANALYSIS MAP

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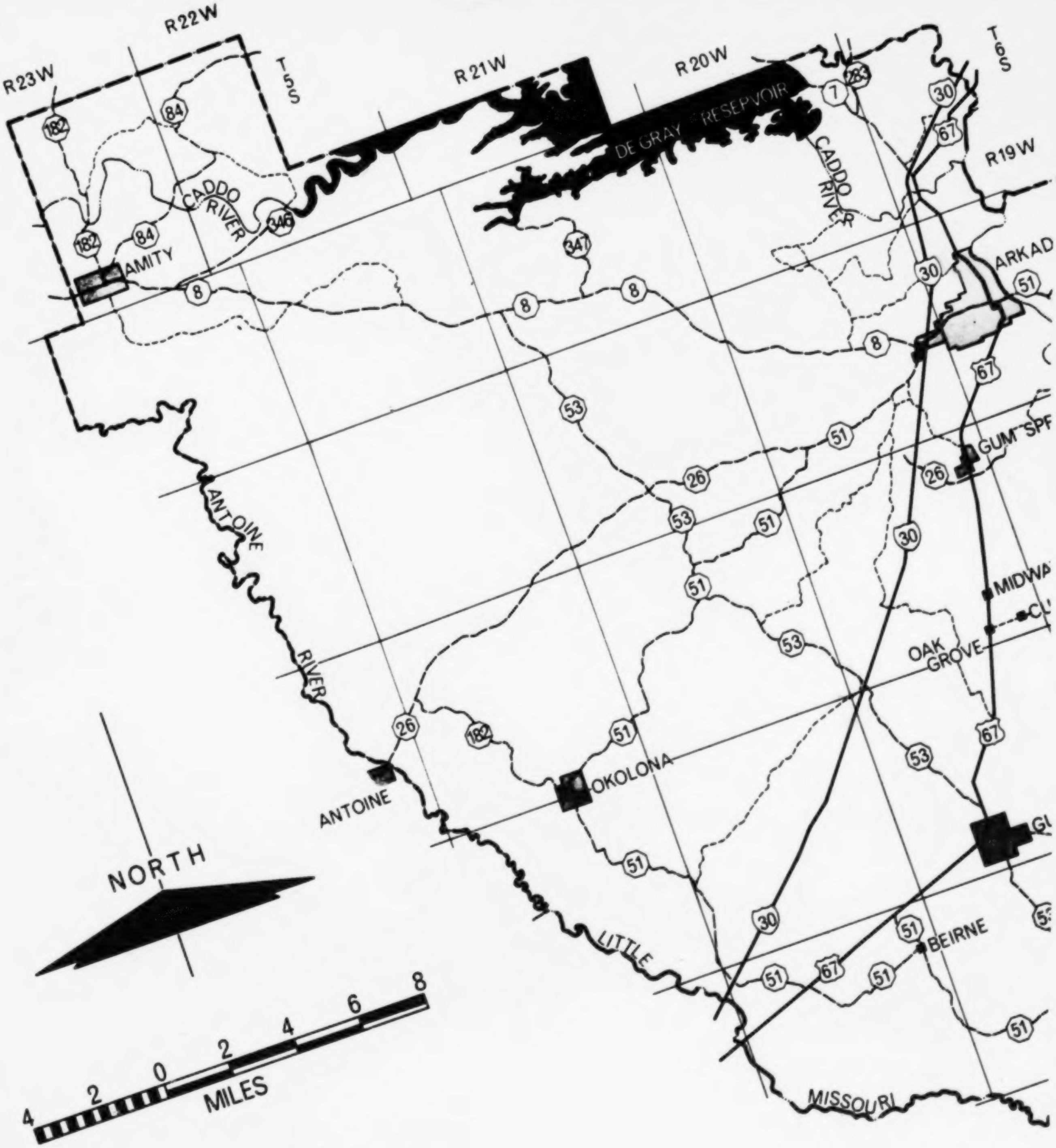
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AMITY
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ARKAD
GUM SPR
MIDWA
OAK GROVE
ANTOINE RIVER
ANTOINE
OKOLONA
LITTLE
MISSOURI
BEIRNE
NORTH
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6
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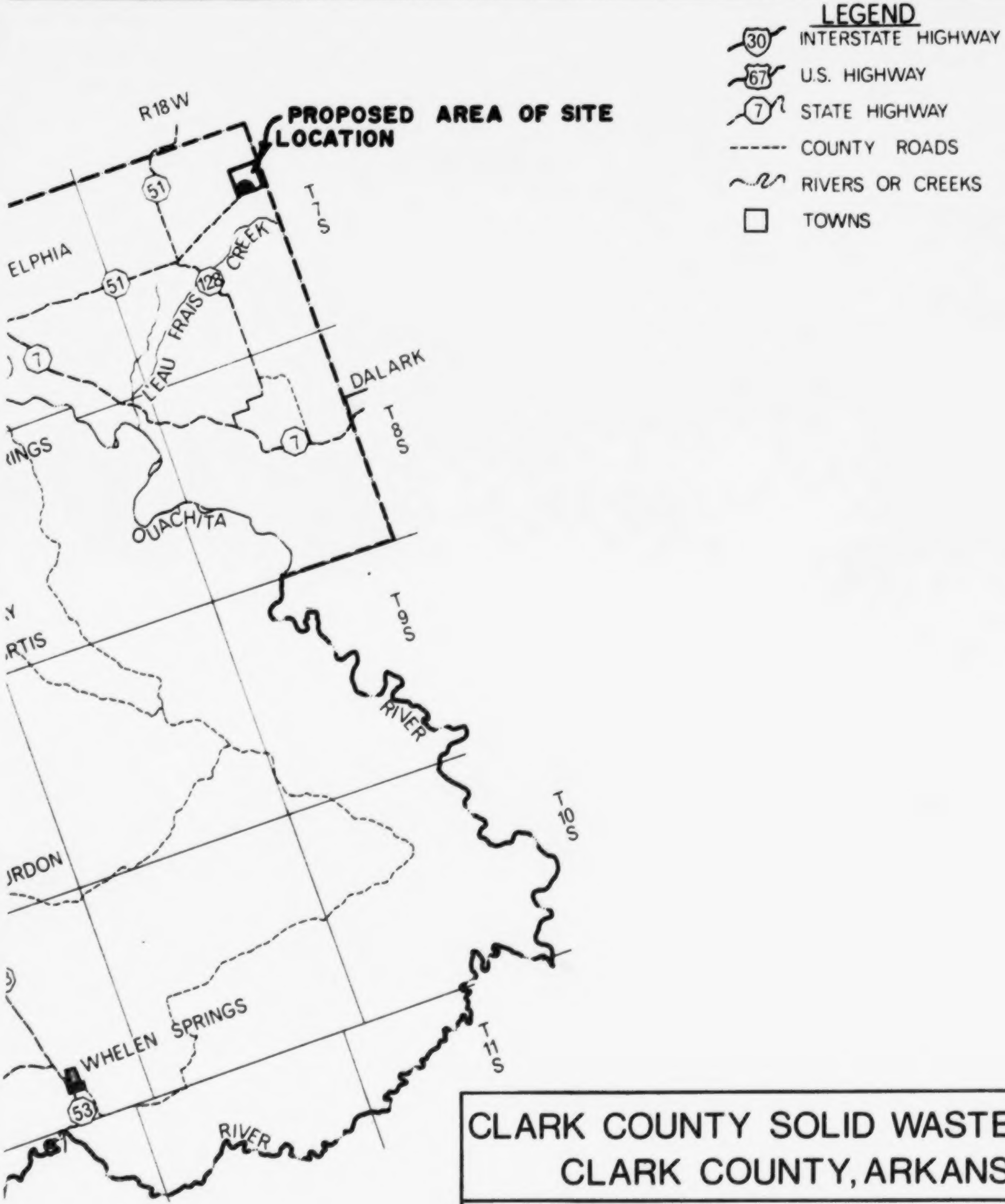
Figure 8, page 1


LEGEND
30 INTERSTATE HIGHWAY
67 U.S. HIGHWAY
7 STATE HIGHWAY
------ COUNTY ROADS
RIVERS OR CREEKS
☐ TOWNS
R18W
PROPOSED AREA OF SITE LOCATION
T 7 S
51
ELPHIA
51
128
CREEK
L'EAU FRAIS
7
DALARK
T 8 S
7
INGS
OUACHITA
T 9 S
Y
RTIS
RIVER
T 10 S
JRDON
WHELEN SPRINGS
53
67
RIVER
T 11 S

CLARK COUNTY SOLID WASTE STUDY
CLARK COUNTY, ARKANSAS

FIG 8. PROPOSED AREA OF SITE LOCATION

page 2

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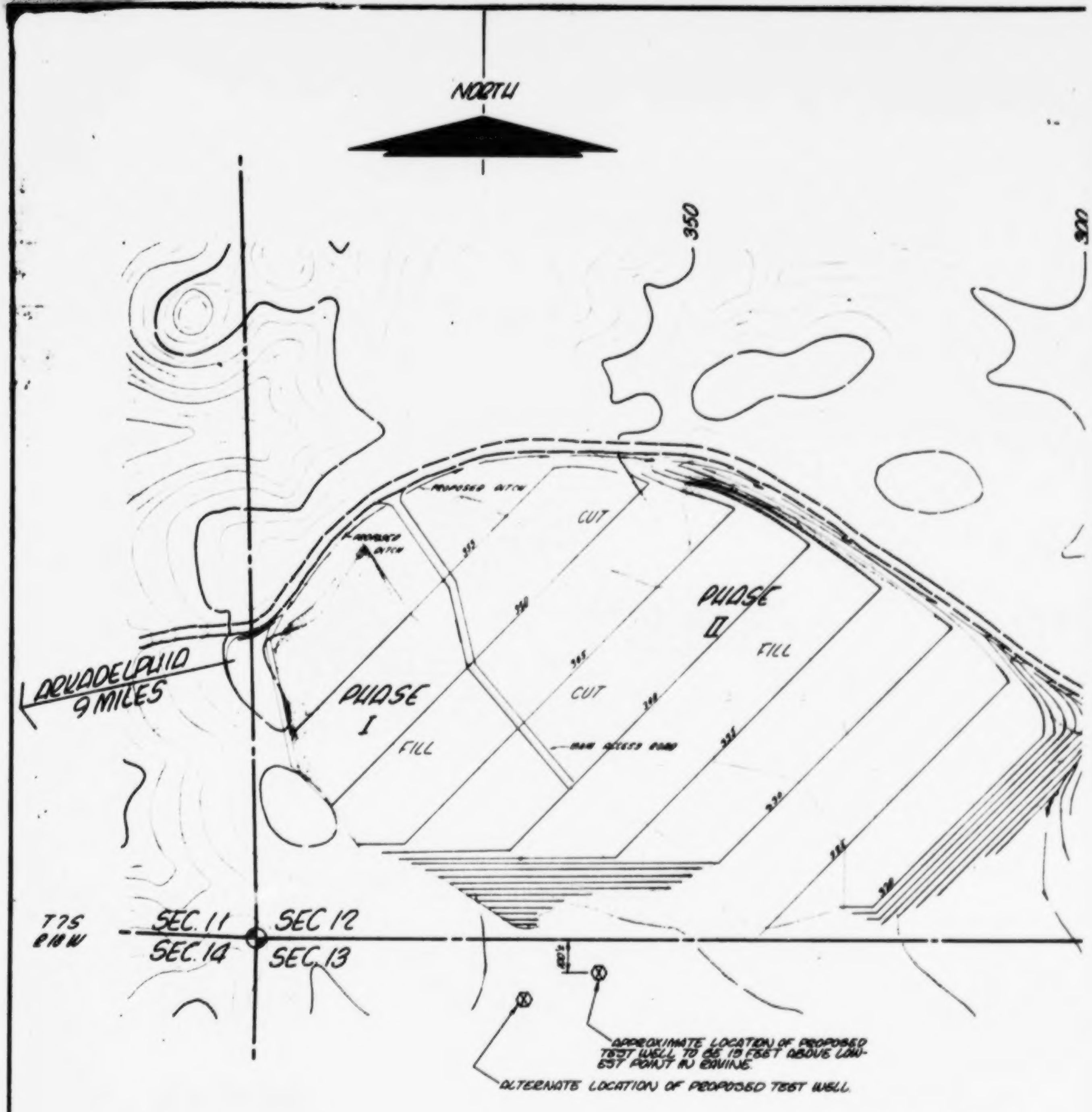
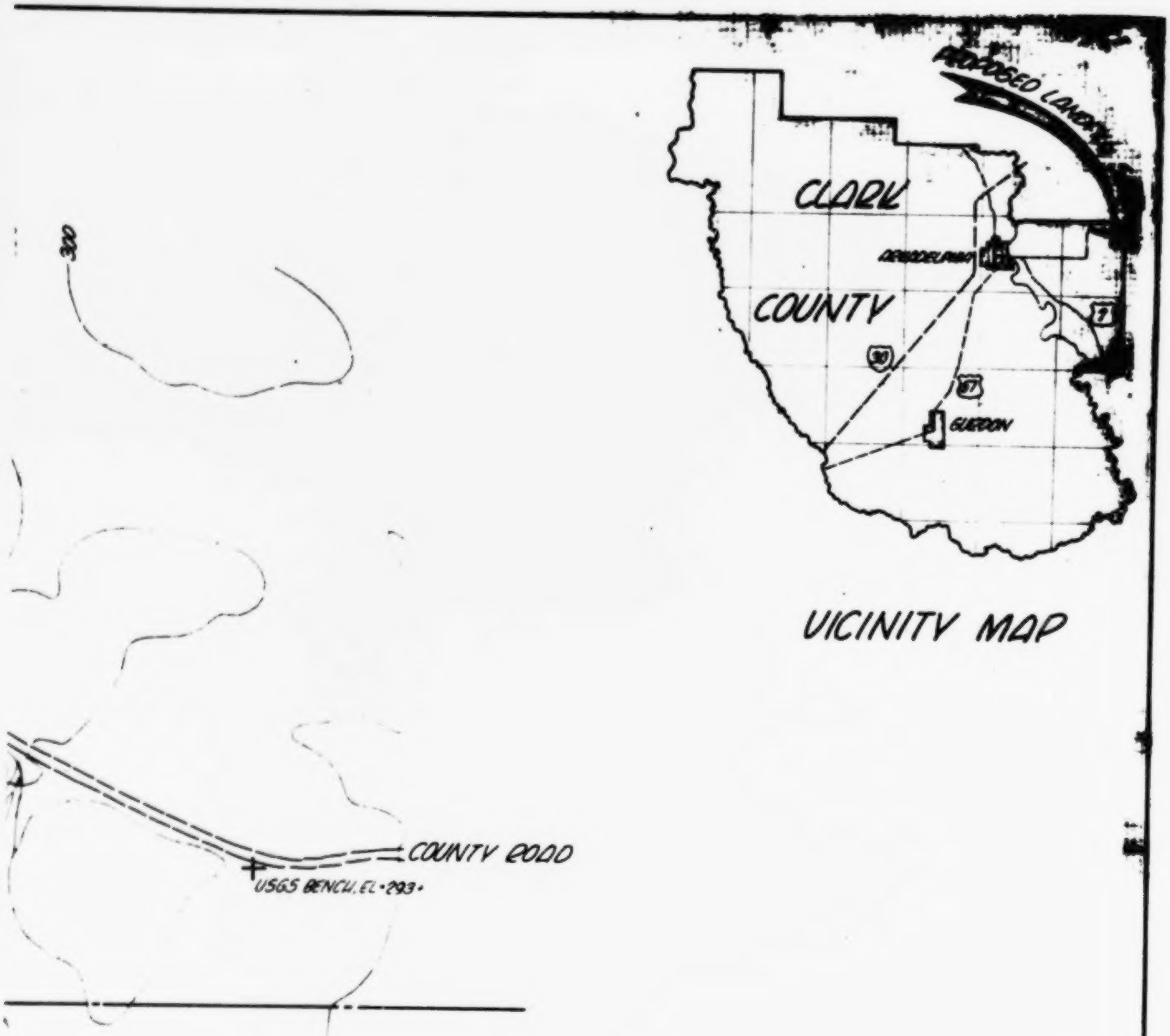

NORTH
350
300
PROPOSED DITCH
PROPOSED DITCH
CUT
PHASE II
FILL
ARKADELPHIA 9 MILES
PHASE I
CUT
FILL
MAIN ACCESS ROAD
T7S R18W
SEC. 11
SEC 12
SEC. 14
SEC. 13
APPROXIMATE LOCATION OF PROPOSED TEST WELL TO BE 15 FEET ABOVE LOWEST POINT IN RAVINE
ALTERNATE LOCATION OF PROPOSED TEST WELL

Figure 9, page 1


PROPOSED LANDFILL
CLARK
COUNTY
ARKADELPHIA
7
30
67
GURDON
VICINITY MAP
330
COUNTY ROAD
USGS BENCH, EL. 293.
GRAPHIC SCALE: 1" = 200'

William E. Fletcher No 2004

	BY	DATE
		8-72
		8-72
		10-72

WILSEY & HAM
OF ARKANSAS INCORPORATED

FIG 9. COMPOSITE PLAN

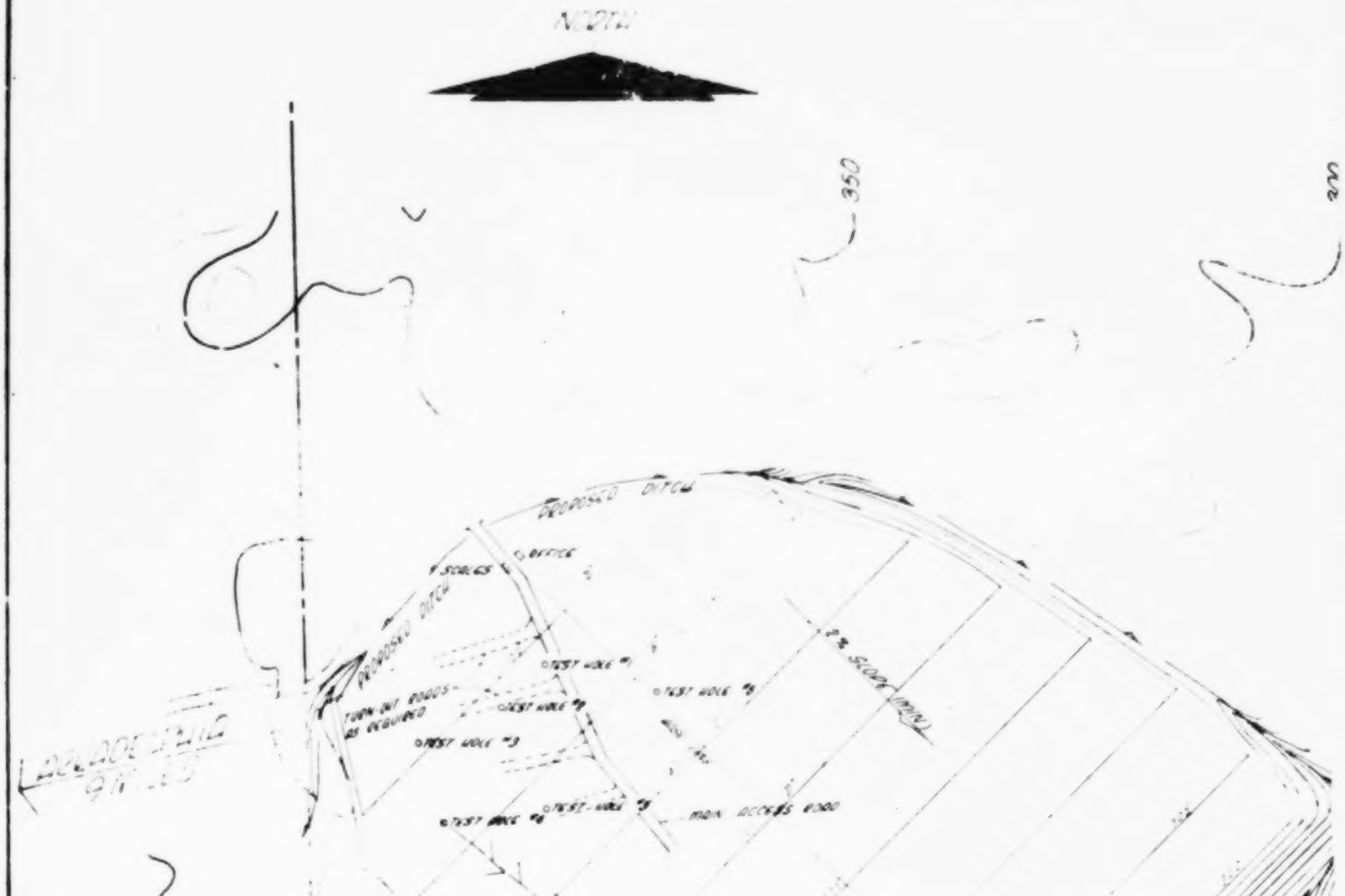
page 2 SANITARY LANDFILL

CLARK COUNTY

ARKANSAS

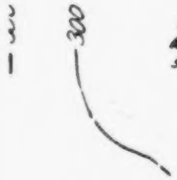
1
5

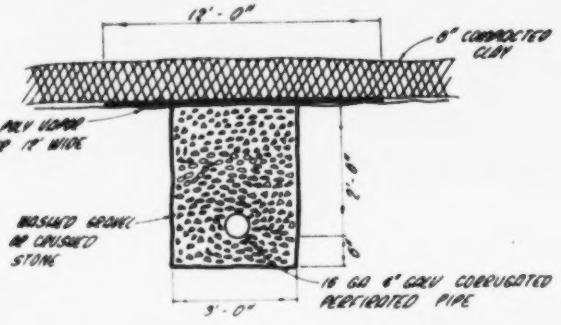
2-1108-0101-30
SCALE 1" = 200'
DATE AUG 1972


NORTH
350
SEC 11
SEC
SEC 14
PROPOSED DITCH
OFFICE
SCALES
PROPOSED DITCH
TEST HOLE #1
TEST HOLE #2
TEST HOLE #3
TEST HOLE #4
TEST HOLE #5
TEST HOLE #6
TURN-OUT ROADS AS REQUIRED
2% SLOPE (MIN)
MAIN ACCESS ROAD
FRENCH DRAIN WITH BRANCH LINES AS REQUIRED
300
300
0"
LIGHT TAN SILT WITH ROCK RANGING FROM 1/4" TO 6" IN SIZE
48"
0"
DARK TAN SILT WITH ROCK RANGING FROM 1/4" TO 6"
30"
RED SILTY CLAY
42"
LIGHT TAN SILT
48"
RED SILTY CLAY
60"
0"
LIGHT TAN SILT
30"
TAN SILTY CLAY
42"
LIGHT TAN SILT WITH SOME CLAY
60"
TEST HOLE #1
TEST HOLE #2
TEST HOLE #3
TEST HOL

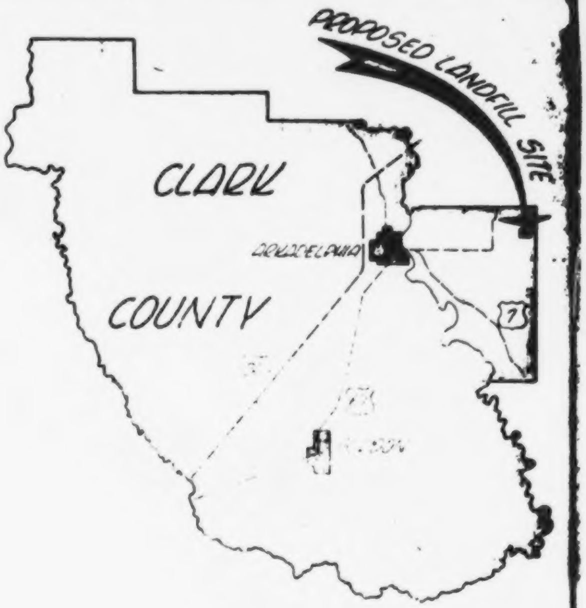
Reproduced from best available copy.

Figure 10, page 1

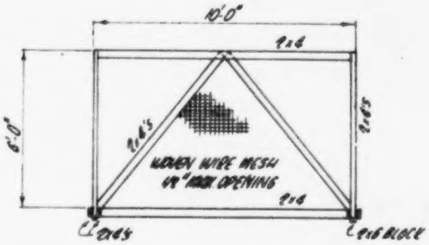



12' - 0"
8" COMPACTED CLAY
6 MIL POLY VAPOR BARRIER 12' WIDE
2'-0"
WASHED GRAVEL OR CRUSHED STONE
0'-0"
16 GA 6" GALV CORRUGATED PERFORATED PIPE
3'-0"

FRENCH DRAIN DETAIL
NTS


PROPOSED LANDFILL SITE
CLARK
COUNTY
ARKADELPHIA
7

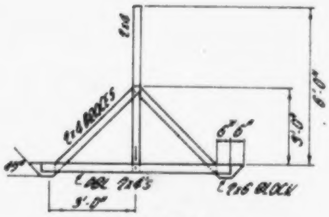
VICINITY MAP


10'-0"
2x4
6'-0"
2x4'S
2x4'S
WOVEN WIRE MESH 1/4" MAX OPENING
2x4
℄ 2x6'S
℄ 2x6 BLOCK

MOVABLE LITTER FENCE
TWENTY SECTIONS REQ'D

200 0 100 200 300 400

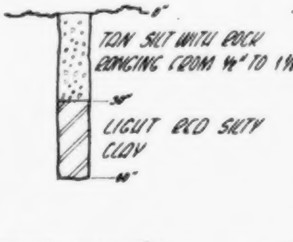
GRAPHIC SCALE: 1"=200'


2x4
2x4 BRACES
6'-0"
3'-0"
6" 6"
45°
℄ DBL 2x6'S
℄ 2x6 BLOCK
3'-0"

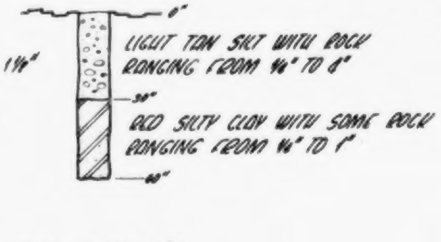
END VIEW

0"
DARK GREY SILT VERY WET
60"

'E #4


0"
TAN SILT WITH ROCK RANGING FROM 1/4" TO 1 1/2"
30"
LIGHT RED SILTY CLAY
60"

TEST HOLE #5


0"
LIGHT TAN SILT WITH ROCK RANGING FROM 1/4" TO 6"
30"
RED SILTY CLAY WITH SOME ROCK RANGING FROM 1/4" TO 1"
60"

TEST HOLE #6

WILLIAM E. BOTCHER
No 3004

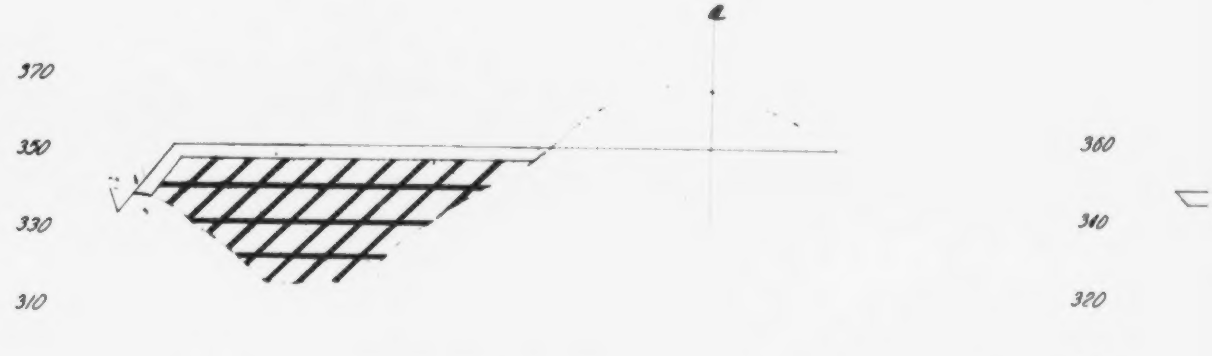
	BY	DATE
Design		8-72
	JAMB.	8-72
	W.77	10-72
Chk Comm		
Proj Eng		
Div Eng		
Fld Bk No		

WILSEY & HAM
OF ARKANSAS INCORPORATED

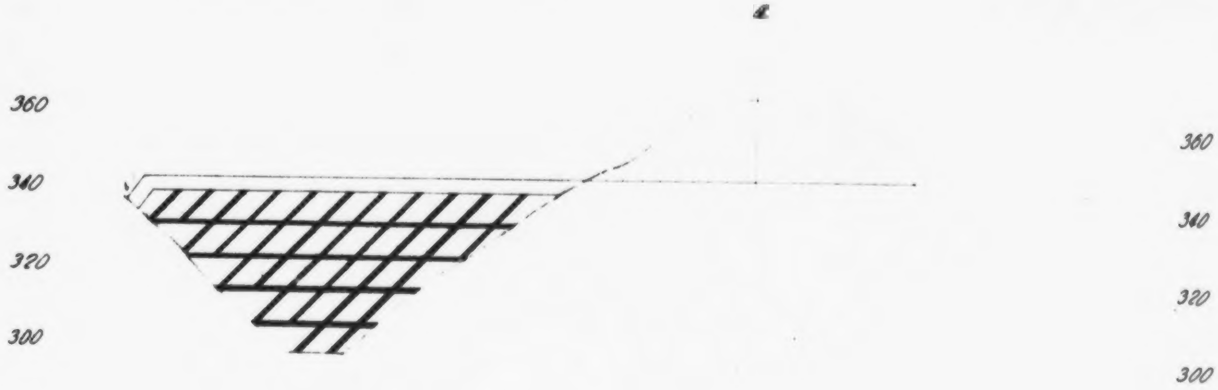
FIG 10. SOIL TEST LAYOUT
page 2 SANITARY LANDFILL
CLARK COUNTY ARKANSAS

2
5

2-110
SCALE: 1"=
DATE:


℄
370
350
330
310
360
340
320
300

SECTION AT LINE "D"


℄
360
340
320
300
360
340
320
300

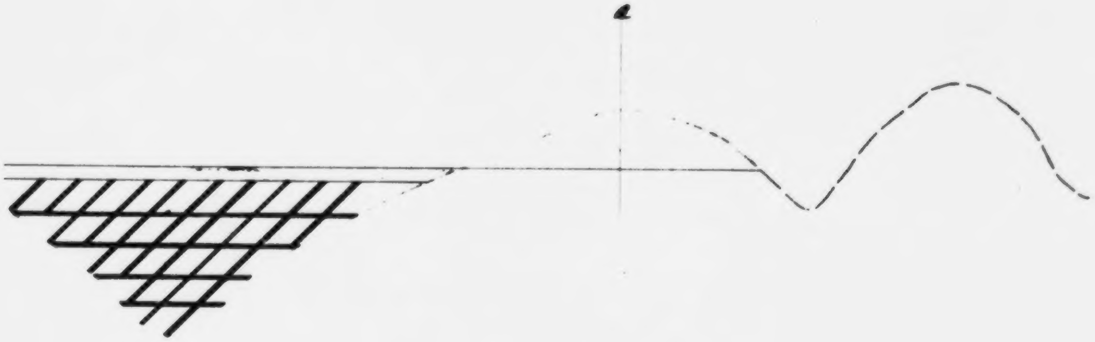
SECTION AT LINE "C"

NOTES

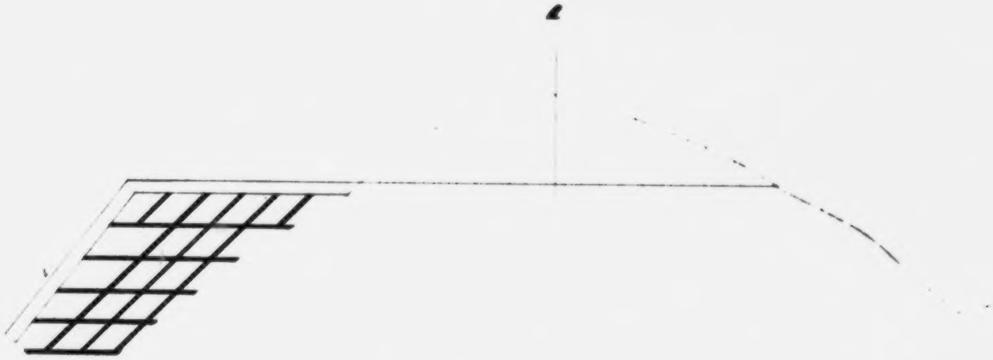
1 DAILY CELL TO BE APPROX. 8 FT THICK
2 DAILY COVER TO BE 6" THICK
3 INTERMEDIATE COVER TO BE 12" THICK
4 FINAL COVER TO BE 36" THICK

Figure 11, page 1

BY DATE REVISIONS



SECTION AT LINE "B"



SECTION AT LINE "D"

LEGEND

▨	COVER MATERIAL
☐	FINAL COVER
░	COMPACTED SOLID WASTE
━━	DAILY COVER
— — —	ORIGINAL GROUND

100 0 50 100 150 200
GRAPHIC SCALE 1" = 100'
(HORIZONTAL)

No 3004
WILLIAM F. FLETCHER

	BY	DATE
Design	W77	10-72
Drawn	WAN	10-72
Chk.	W77	10-72
Chk/Const.		
Proj. Eng.		
Div. Eng.		
Fld. Bk. No.		

WILSEY & HAM
OF ARKANSAS INCORPORATED

FIG 11. SECTIONS
page 2 SANITARY LANDFILL
CLARK COUNTY ARKANSAS

4/5
DWG. NO.
7-1148-0101
SCALE: HORIZ. [illegible]
DATE: OCT. 1972

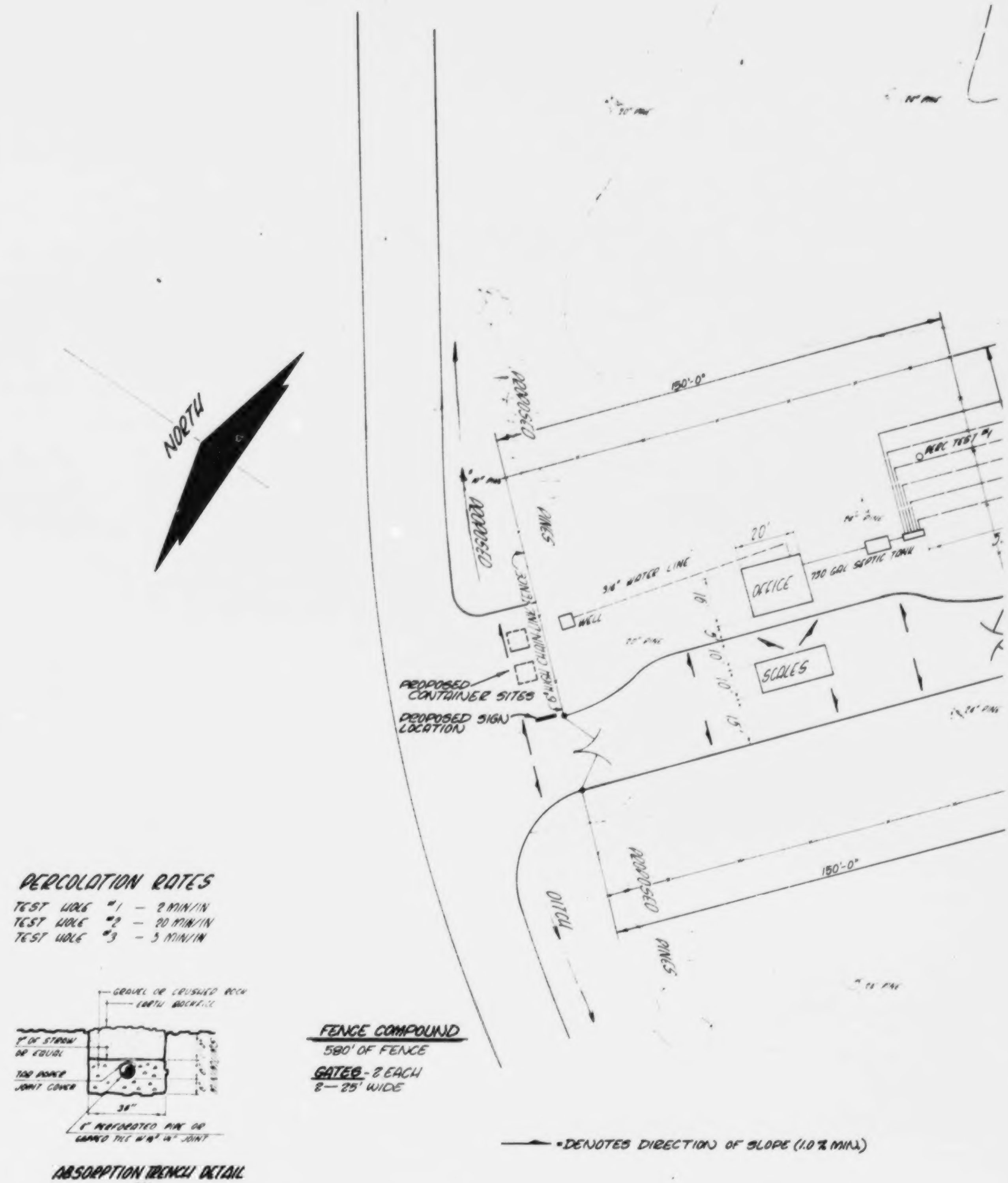
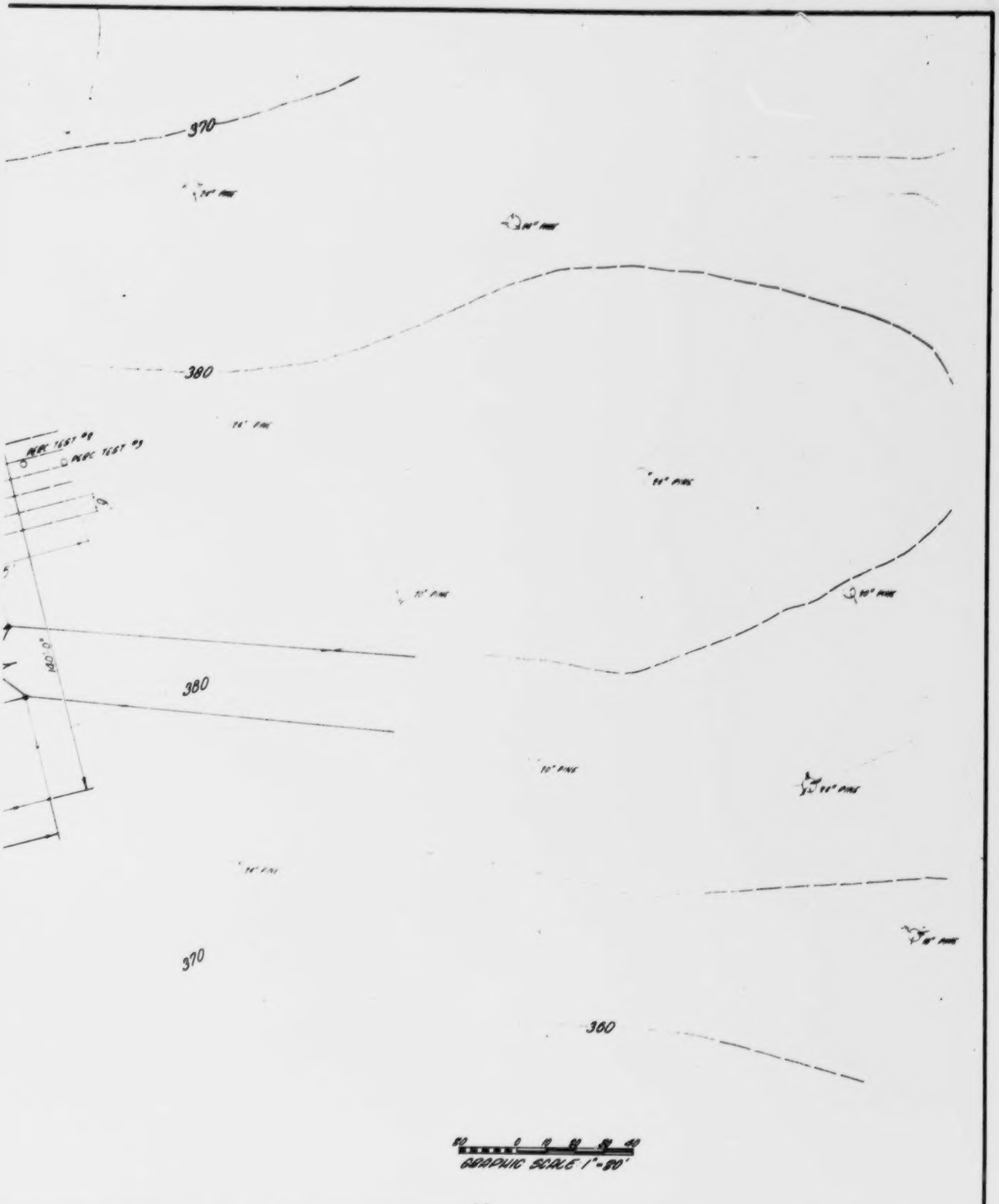

NORTH
PROPOSED
150'-0"
PERC TEST #1
PROPOSED
PINES
20'
3/4" WATER LINE
OFFICE
750 GAL SEPTIC TANK
WELL
6' HIGH CHAIN LINK FENCE
SCALES
16
6
10
10
15
PROPOSED CONTAINER SITES
PROPOSED SIGN LOCATION
PROPOSED
150'-0"
DITCH
PINES
PERCOLATION RATES
TEST HOLE #1 — 2 MIN/IN
TEST HOLE #2 — 20 MIN/IN
TEST HOLE #3 — 3 MIN/IN
GRAVEL OR CRUSHED ROCK
EARTH BACKFILL
1" OF STRAW OR GRAVEL
TAR PAPER JOINT COVER
36"
4" PERFORATED PIPE OR CAPPED TILE W/ 1/4" JOINT
ABSORPTION TRENCH DETAIL
NTS
FENCE COMPOUND
580' OF FENCE
GATES - 2 EACH
2 — 25' WIDE
= DENOTES DIRECTION OF SLOPE (1.0 % MIN.)

Figure 12, page 1



370
380
380
370
360
PERC TEST #8
PERC TEST #9
9'
5'
140'-0"
10" PINE
10" PINE
GRAPHIC SCALE 1" = 20'

	BY	DATE
Design	WTF	9-72
Drawn	WMN	9-72
Ckd.	WTF	9-72

No 5004

WILSEY & HAM
OF ARKANSAS INCORPORATED

FIG 12. OFFICE PLOT PLAN

page 2 SANITARY LANDFILL

CLARK COUNTY ARKANSAS

3/5

7-1180-0101

SCALE 1" = 20'

DATE SEPT. 1972

Site Analysis

General - The proposed sanitary landfill site contains approximately 27.7 acres in Phase I and approximately 40 acres in Phase II.* Timber was removed from the property by International Paper Company in 1969. There are still numerous large pine trees scattered over the property and some small hardwood. All property adjacent to the proposed site is also timberland area. The nearest residential home is about one-half mile west of the proposed site.

Drainage - Generally speaking the county road which runs along the north side of the proposed site is a drainage divide for the area. The water which falls north of the county road drains north and that which falls south of the county road drains south. A proposed ditch, which is shown on the Plans, running along the south side of the county road will detour all run-off water around the landfill. The site is presently well drained with two separate ravines which drain into L'Eau Frais Creek about one mile south of the proposed site. This creek drains into the Ouachita River about five miles from this point.

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*Note: Actual site design, working drawings, and operational specifications were accomplished by B. & F. Engineering, Inc., of Hot Springs, Arkansas. See figures 9-12.

Soil Conditions - Six test holes were drilled on the proposed landfill area by the engineer with a six inch auger type drill. The location and the results of these borings are shown on the Plans. In general, the ridge which runs through the center of the proposed site is a well compacted light tan silt with rock ranging from one-quarter inch to four inches in size down to an elevation of about 325 feet. The areas below the 325 foot contour is a very silty clay, light tan in color, with the exception of the bottom of the ravine on the southwest side of the ridge which is a very wet, dark gray silt. Although there was no surface water at the time the borings were made, it is apparent that there are some springs located in this area during the wet seasons of the year. A copy of the geologist report for this area is in Appendix A.

Additional insight was gained into the subsurface soil picture at the time the water well was dug, some 16 months after the initial site engineering work was done. The well is a 65 foot deep "dug" well. The actual hole is dug and cased and is 36" in diameter. Figure 13 diagrams the various soil strata encountered with their corresponding depths.

Roads - The proposed sanitary landfill site will be accessible by approximately two miles of county road which will be surfaced with double seal asphalt by the

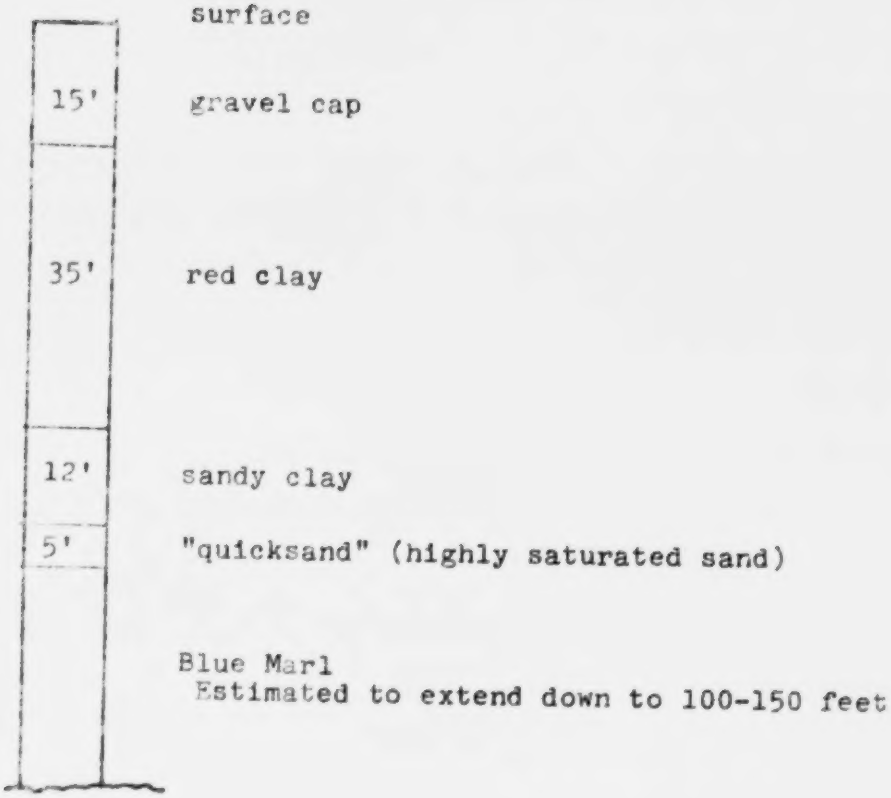
surface
15'
gravel cap
35'
red clay
12'
sandy clay
5'
"quicksand" (highly saturated sand)
Blue Marl
Estimated to extend down to 100-150 feet

Figure 13. Diagram of Soil from Water Well Hole.

county from State Highway 51 at Joan, Arkansas to the proposed landfill site. The roads within the landfill area consist of one main road which runs southeasterly along the ridge with temporary roads turning southwesterly into Phase I and northeasterly into Phase II.

Estimated Volumes - The estimated potential volume of Phase I excluding the final cover is 383,000 cubic yards which was calculated by the area of sections method. Assuming approximately ten per cent of this volume will be consumed by daily and intermediate cover, Phase I will have an approximate net capacity of 345,000 cubic yards compacted solid waste. Assuming a density of 1,000 lbs. per cubic yard for compacted solid waste and using an annual tonnage of 24,500 tons of refuse to be generated in Clark County, Phase I should have a life of approximately seven years.

LEGAL AND FINANCIAL CONSIDERATIONS

Legal Authority

The basic authority for Clark County as an entity of government to implement and finance the Solid Waste Program is Arkansas Act 238 of 1971.

The Act states in Section 1: "Any county or municipality in this State is hereby authorized to own, acquire, construct, reconstruct, extend, equip, improve, operate, maintain, sell, lease, contract concerning, or otherwise deal in facilities of any nature necessary or desirable for the control, collection, removal, reduction, disposal, treatment or other handling of refuse. . ."

The Act further states in Section 2 that: "Counties and municipalities are hereby authorized to use any available revenues for the accomplishment of the purposes set forth in Section 1 hereof, including the proceeds of revenue bonds issued under the authority of this Act, either alone or together with other available funds and revenues. The amount of revenue bonds issued shall be sufficient to pay the cost of accomplishing the specified purposes, the cost of issuing bonds, the amount necessary for a reserve, if desirable, the amount necessary to provide for debt service on bonds until revenues for the payment thereof are available, and any other costs and expenditures of whatever nature incidental to the accomplishment of the specified purposes."

Bonds issued pursuant to this Act shall not be general obligations of the County, but shall be special obligations, and in no event shall the bonds constitute an indebtedness of the County within the meaning of any constitutional or statutory limitation. And, bonds issued under the Act shall be exempt from all State, county, and municipal taxes except property taxes."

Several provisions of this Act need to be emphasized. Section 7(d) states that "The bonds shall be executed by the county judge and county clerk of the county or by the mayor and the city clerk or recorder of the municipality (with either the manual or facsimile signature of the county judge or mayor but with the manual signature of the clerk or recorder), and in case any of the officers whose signatures appear on the bonds or coupons shall cease to be such officers before the delivery of such bonds or coupons such signatures shall nevertheless be valid and sufficient for all purposes. The coupons attached to the bonds may be executed by the facsimile signature of the county judge of the county or the mayor of the municipality."

Section 7(b) states "Counties and municipalities are hereby authorized to impose upon and collect from all persons who can be served by a project reasonable rates and charges for the services of the project, without regard to whether such person desires to utilize the services."

The State Attorney General had rendered an opinion concerning Section 7(b) and can be found in Appendix B. In short, the opinion stated, with reference to the mechanics of user fee collection, that "a system of collection could be set up so that the bills for such collection could be sent out with the property tax bill to all owners of realty."

Section II states "Any county or any municipality is hereby authorized and empowered to enter into a compact with any county or counties, any municipality or municipalities, the United State of America and/or the State of Arkansas, or any agency or political subdivision thereof, for the purpose of a cooperative effort to carry out any or all of the purposes authorized by this Act. Any such compact may provide for joint ownership and/or joint operation of any facilities, and may contain such other terms and conditions as the parties deem necessary or desirable for the accomplishment of any of the purposes authorized by this Act."

Financial Analysis

The total initial cost of the Solid Waste Management System was estimated at $178,554.00 and was allocated as follows:

1.	Sanitary Landfill	$103,055.00
2.	Rural Collection System	75,499.00
	Total Initial Cost	$178,554.00

During the early stages of management planning, several different funding sources were investigated. Application was made to the E.P.A. for a demonstration project grant. E.P.A. entered into a contract with Clark County for a grant in the amount of $93,434.00 for the development of a demonstration Sanitary Landfill (Table 5). Additional money, in the amount of $68,700.00, was obtained through the sale of revenue bonds to provide local matching money requirements and other costs (Table 6). Revenue bond proceeds and E.P.A. grant money applied specifically to Landfill construction and equipment purchases. Detailed capital cost estimates for each category are provided in Table 7.

Another $75,000.00 was obtained through a Quorum Court appropriation of Federal Revenue Sharing money. This appropriation was specifically designated for equipment purchase and construction related to the rural collection system. A summary of these items is found in Table 8.

Table 5. E.P.A. ELIGIBLE COSTS AND GRANT AWARD

Item	Eligible	E.P.A. Grant
Salaries and Wages	$18,500.00	$18,500.00
Fringe Benefits	2,943.00	2,943.00
Consultant Services	5,175.00	5,175.00
Equipment	62,736.00	45,035.00
Travel	218.00	218.00
Publication Costs	4,600.00	4,600.00
Other	1,400.00	1,400.00
Construction	31,270.00	15,563.00
Total Grant	$126,842.00	$93,434.00

Table 6. SUMMARY OF REVENUE BOND FUNDS

Budget	
County Matching Money	$19,486.00
Road Paving (External Access)	12,600.00
Dump Reclamation	6,000.00
Operating Capital - Six Months	22,607.00
Debt Service Reserve	6,020.00
Legal and Accounting Services	1,987.00
Total Revenue Bonds	$68,700.00

Table 7. PROJECTED INITIAL CAPITAL REQUIREMENTS SANITARY LANDFILL

	Total Development Cost
*Building Facility	
Shelter and Storage	$ 5,000.00
Fence	1,437.00
Signs	200.00
2 miles Roadway-at $2,800/mile seal cost Roadbed preparation & widening @$7,000	12,600.00
*Site preparation (clearing & grubbing) @$400/acre on 5 acres	2,000.00
*Utilities Phone, electricity, thermogas, water	1,000.00
*Office Equipment-desk, chairs, file cabinet, adding machine	750.00
*Site Design (Job Total	3,000.00
Dump Rehabilitation	6,000.00
Employee Training: Per	500.00
*Equipment Heavy	
Crawler tractor with bucket	48,200.00
Scales - 60,000 #cap ($8,500 scales +2,000 installation)	10,500.00
Wood Chipper $2,500	2,500.00
	$93,687.00
Contingency 10%	9,368.00
	$103,055.00

*Denotes the items considered absolutely necessary to the proper functioning of a sanitary landfill and therefore is that amount which is shown as cost to users in operating costs and in computing cost per household.

Table 8. PROJECTED INITIAL CAPITAL REQUIREMENTS
RURAL COLLECTION SYSTEM

**Containers: 80-4 cubic yards at $240/container	$19,200.00
*60 Road Pullouts at $221.43/pullout	13,285.80
**Compactor Truck: 30 cubic yards	28,000.00
**Flatbed Truck: with wench	5,000.00
**Steam Generator:	750.00
**Radios: 2 at $1,200 each	2,400.00
	$68,635.80
Contingency 10%	6,863.58
	$75,499.38

*Cost estimate from Chilton County Report

**Denotes the items considered absolutely necessary to the proper functioning of a rural collection system and therefore is that amount which is shown as cost to users in operating costs and in computing cost per household.

Financial Feasibility

Total annual operating cost for the County Solid Waste System is projected to be $60,864.00. These estimated costs are provided in Tables 9 through 11.

Operating costs for the system will be supported by revenues obtained from user charges. The method used to arrive at an equitable cost burden for each user and for each governmental entity involved in the management system was to prorate cost using a formula of population times a refuse generation factor. The refuse factor for Arkadelphia was 4.0 lbs. per person per day and for all other municipalities and rural areas, 3.0 lbs. per person per day. This methodology resulted in a cost sharing schedule as summarized in Table 12. Detailed analyses of pro-rated costs for each political subdivision are provided in Tables 13, 14, and 15.

These cost shares served as the basis for the operational support for the first year. Service contracts for collection and disposal will be re-established at the end of the first year based upon weight records kept at the landfill site. Cost shares will then reflect actual weights collected and disposed.

In terms of cost per household, cost of the system is very reasonable. Disposal cost for Arkadelphia residents was estimated at $7.12 per household per year. This figure is only that which applies to Arkadelphia's share of the

Table 9. MAINTENANCE AND OPERATION COST LANDFILL AND COLLECTION

Personnel Positions	Title	Annual Cost
1	Manager/Dozer Operator (Est. 2080 hrs @$3.25 per hr)	$ 6,760.00
1	Assistant Dozer & Compactor Truck Operator (Est. 2080 hrs @$2.50 per hr)	5,200.00
1	Collection Driver (Est. 2080 hrs @$2.50 per hr)	5,200.00
	Overtime est. @832 hrs x $4.32 per hr.	3,593.25
	Extra help est. @ 520 hrs x $2.00 per hour	1,040.00
	Total Salaries and Wages	$ 21,794.24
Benefits		
	Insurance est. @$18.00 per month per employee	$ 588.00
	Retirement est. @.07 of total salary and wages	1,525.70
	Social Security est. @5.2 of total salaries and wages	1,133.29
	Total Personnel Cost	$ 25,041.23
Maintenance and Operation		
	Gas, oil, and other equipment supplies	$ 4,112.04
	Equipment Repairs	5,936.64
	Utilities (electricity)	480.00
	Postage	252.00
	Telephone	240.00
	Facility Repairs	500.00

Administrative Supplies	300.00
	$11,820.68
Contingency est. @.10 of total operation and maintenance	1,182.07
Total Maintenance and Operations	$13,002.75
Total Personnel	25,041.23
Depreciation	13,041.23
Debt Service	8.900.00
GRAND TOTAL	$60,863.98

Table 10. PROJECTED OPERATING COST
SANITARY LANDFILL

Personnel Positions	
Manager/Dozer Operator (Est. 2080 hrs @3.25/hr.	$ 6,760.00
Assistant Dozer & Truck Drive (Est. 2080 hrs @$2.50/hr.	5,200.00
Overtime est. @554 hrs x $4.32	2,393.00
Total Salaries	$14,353.00
Benefits	
Ins. est. @19.20 per mo. per employee	460.80
Other Insurance	201.64
Retirement est. @.07 of total salary and wages	1,004.71
Social Security est. @.0585 of total	839.65
Total Benefits	$ 2,514.00
Total Personnel	$16,867.00
Maintenance and Operations	
Dozer, TD15-C	
Gas, oil, maintenance	$ 7,180.00
Depreciation	4,340.00
Utilities	480.00
Telephone	240.00
Facility Repairs	475.00
Postage	252.00
Administrative Supplies	300.00
Depreciation (physical plant)	1,476.00
Debt Service	4,814.00
Total Maintenance and Operations	$19,557.00
Total Annual Operating Cost	$36,424.00

Table 11. PROJECTED OPERATING COST
RURAL COLLECTION SYSTEM

Personnel Positions	
Collection Drive - Est. 2080 hrs. @$2.50/hr	$ 5,200.00
Overtime est. @278 hrs x 4.32/hr.	1,200.96
Total Salaries	$ 6,400.96
Benefits	
Insurance est. @$19.50/mo/employee	234.00
Retirement est. @.07 of total salary	448.06
Social Security est. @.0585	374.45
Total Benefits	$ 1,056.51
Total Personnel	$ 7,457.47
Maintenance and Operations	
Oil, gas, grease	$ 2,232.04
Equipment Repair & Maintenance	2,936.64
Depreciation	5,900.00
Debt Service	3,603.85
Total Maintenance & Operations	$14,672.53
GRAND TOTAL	$22,130.00

Table 12. COST SHARES AND SOURCES OF REVENUES

Political Subdivision	Cost Share
1. Arkadelphia	$15,105.00
2. Gurdon	6,922.00
3. Amity	2,047.00
4. Gum Springs	899.00
5. Okolona	780.00
6. Whelen Springs	422.00
7. Non-Municipal Area	27,964.00
8. State Park	5,000.00
9. Corps of Engineers	7,500.00
TOTAL	$66,639.00

Table 13. SUMMARY OF TOTAL ANNUAL COST SHARE BY DIVISION

Clark County By Division	Landfill	Rural Collection	Total
Arkadelphia	$16,365.30*	$---------	$16,365.30
Gurdon	2,997.70	3,923.65	6,921.35
Amity	885.10	1,161.82	2,046.92
Gum Springs	389.74	508.99	898.73
Okolona	338.74	440.39	779.13
Whelen Springs	182.12	239.00	421.12
Rural	12,107.34	15,856.15	27,963.40
	$33,266.04	$22,130.00	$55,396.04
Add State & Corps	3,157.96		3,157.96
	$36,424.00		$58,554.00

MONTHLY AND ANNUAL COST PER HOUSEHOLD BY DIVISION

	Landfill	Collection	Total	Landfill	Collection	Total
Arkadelphia	.593		.59	7.12		7.12*
Gurdon	.500	.654	1.15	6.00	7.85	13.85
Amity	.509	.668	1.18	6.10	8.01	14.11
Gum Springs	.541	.707	1.25	6.50	8.48	14.98
Okolona	.513	.661	1.17	6.16	8.01	14.17
Whelen Springs	.506	.664	1.17	6.01	7.97	13.98
Rural	.480	.620	1.11	5.77	7.55	13.32

*This amount includes only that required for landfill operation and does not show the cost of operating the urban collection system. Arkadelphia will collect a service charge that will cover both disposal facility operational cost and urban collection operational costs.

Table 14. SANITARY LANDFILL COST SHARE ANALYSIS

Sanitary Landfill:	Annual Cost $36,424.00*	Monthly Cost $3,035.34

	1 Pop.	2 Households	3 *Refuse	4 Pds. Refuse by Division/Day	5 % of Refuse Production
Arkadelphia	8,500	2,300	4.0	34,000.00	44.93
Gurdon	2,075	500	3.0	6,225.00	8.23
Amity	614	145	3.0	1,842.00	2.43
Gum Springs	269	60	3.0	807.00	1.07
Okolona	233	55	3.0	699.00	.93
Whelen Springs	126	30	3.0	378.00	.50
Rural (Non.Inc.)	8,385	2,100	3.0	25,155.00	33.24
	20,202	5,190			
State	700,000*			3,835.61	5.07
Corps	2,000,000*			2,724.79	3.60
				75,666.40	100.00

*Visitors Per Year

	6 Allocation of Monthly Op. Cost By Division	7 Annual Cost By Division	8 Monthly Cost Per Household	9 Annual Cost Per Household
Arkadelphia	$1,363.78	$16,365.30	.593	7.12
Gurdon	249.81	2,997.70	.500	6.00
Amity	73.75	885.10	.509	6.10
Gum Springs	32.48	389.74	.541	6.50
Okolona	28.23	338.74	.513	6.16
Whelen Springs	15.18	182.12	.506	6.01
Rural (Non.Inc.)	1,008.95	12,107.34	.480	5.77
State	153.89	1,846.70		
Corps	109.27	1,311.26		
	$3,035.34	$36,424.00		

*Includes Debt Service Requirement

Table 15. RURAL COLLECTION SYSTEM COST SHARE ANALYSIS

Rural Collection System:	Annual Cost	Monthly Cost
	$22,130.00*	$1,844.17

Clark County By Division	Pop.	Households	Refuse Factor	Pds. Refuse by Division/Day	% Total By Division
Gurdon	2,075	500	3.0	6,225.00	17.73
Amity	614	145	3.0	1,842.00	5.25
Gum Springs	269	60	3.0	807.00	2.30
Okolona	233	55	3.0	699.00	1.99
Whelen Springs	126	30	3.0	378.00	1.08
Rural	8,385	2,100	3.0	25,155.00	71.65
	11,702	2,890		35,106.00	100.00

	Allocation of Monthly Op. Cost By Division	Annual Cost By Division	Monthly Cost By Household	Annual Cost By Household
Gurdon	$ 326.97	$3,923.65	.654	7.85
Amity	96.82	1,161.82	.668	8.01
Gum Springs	42.41	508.99	.707	8.48
Okolona	36.70	440.39	.661	8.01
Whelen Springs	19.92	239.00	.664	7.97
Rural	1,321.35	15,856.15	.629	7.55
	$1,844.17	$22,130.00		

*Includes Debt Service Requirement

disposal facility cost and does not include the City's cost for house-to-house collection. The cost per rural household (non-incorporated area) was estimated to average $14.00 annually. This figure does include cost for disposal and rural collection.

User charges to rural households will be made one time annually by attaching the service charge bill to the property owner's tax bill as outlined by the State Attorney General (See Appendix B).

Revenues as outlined in Table 12 are insured through existing contractural agreements between Clark County and other governmental entities (Appendix E). Payments for services rendered are made from municipal government to County government. Each municipality is responsible for collecting its own user charges.

SYSTEM IMPLEMENTATION

Introduction

Project implementation began in early January of 1973 with the acceptance of bids on all project equipment. Actual implementation action was concerned with equipment procurement, selection and education of project personnel and construction of facilities. These procedures are reviewed in the following paragraphs.

Landfilling operations began on June 4, 1973. On that date, the facility began receiving waste from the City of Arkadelphia. Due to a late truck delivery, the County rural collection service did not become operational until early October, 1973. Actual weighing operations did not begin until March 7, 1974.

Equipment Selection

Two pieces of equipment were purchased for the Sanitary Landfill, a TD-15C International dozer and a set of Toledo, 60,000 pound capacity truck scales.*

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*The use of brand names for items of equipment used in this report does not constitute endorsement of those products. Such references are used merely as a specific designation as an aid to comprehension and identification.

The tractor selected for waste compaction, and cover operations was an International, TD-15C equipped with a hydraulically operated Rockland "landfill blade" and an all-weather cab. Twenty inch treads were selected as being suitable for landfill operations. Also purchased with the tractor was a rear cable control unit for possible future use with a pull scraper. The operating weight of the unit, with fuel, is approximately 15.5 tons and is shown compacting and covering wastes in Figure 14 and 15 respectively. Operating experience has indicated that the tractor as outlined above is sufficient for the quantities and types of wastes being handled.

The second equipment purchase item for the landfill was the set of 60,000 pound truck scales. The question has been asked as to why a set of scales is necessary. Clark County's situation, in which each political subdivision shares in the total operating cost, demands an equitable system of distributing costs to those political subdivisions. It was felt that the only method which would fairly distribute the costs on a readily and accurately measured basis was a system of weighing material from each source, then pro-rating the cost based upon waste quantity generated. The maximum gross weight recorded to date for any one load has been 53,100 lbs. carried in by the County compactor on August 31, 1974.

Equipment needed for the rural collection system included waste containers, a packer body and chassis, and a

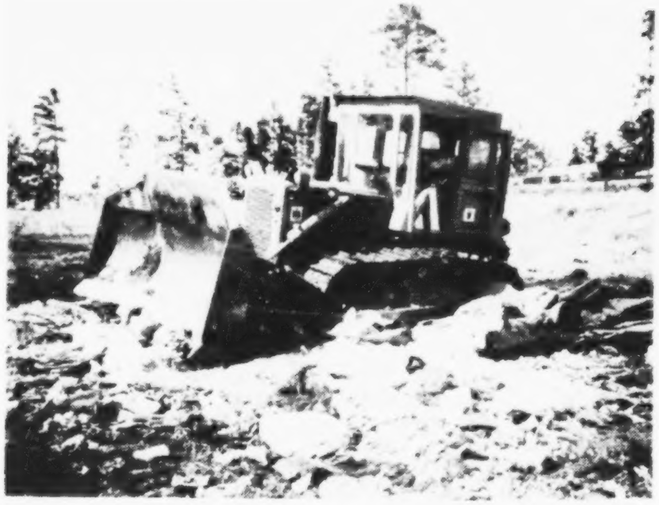


Figure 14. Compacting Waste

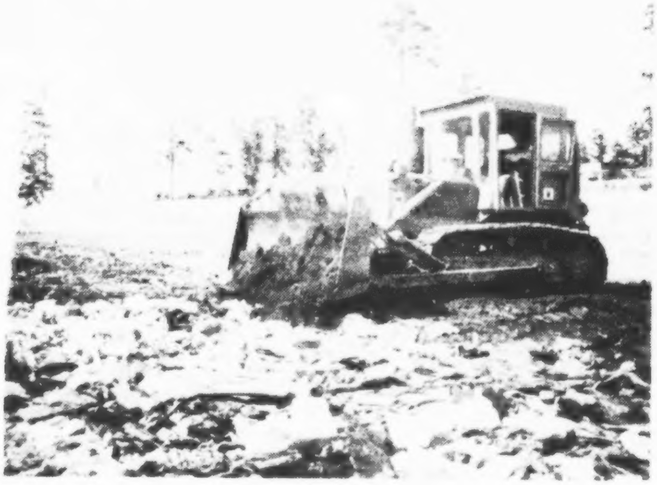


Figure 15. Covering Waste

2-1/2 ton tilt bed truck. Three container sizes are being used in the Clark County system, three yard, four yards, and six yards. There are, as of October 15, 1974, 142 containers being used. One hundred of these are four yard containers, twenty are three yard containers, and twenty-two are six yard containers.

The four yard containers are being used in the rural areas; the three yard boxes are being used for commercial accounts and for added capacity at problem points in rural areas; and the six yard boxes are being used in the Cities of Gurdon and Amity and for commercial accounts.

A design adapted from containers used in Chilton County, Alabama, was used for the four yard box. They are top loading units. The length from side to side, the depth from front to back, and the height from bottom to top (as viewed by one approaching the front of the bin at which waste loading is most easily possible) are 72 inches, 54 inches, and 48 inches, respectively. Pictures of the containers are provided in Figures 16, 17, and 18. This design was used since it is easier for the housewife to reach and thus easier for her to handle the garbage.

The packer body chosen has a front-end-loading lift capacity of 6,000 pounds and a waste holding capacity of 30 cubic yards. The unit was built by E-Z Pack. Another feature of the unit includes a 70-gallon washwater tank. The washwater tank enables the driver to apply a mixture of disinfectant and insecticide at the container location as the need arises.

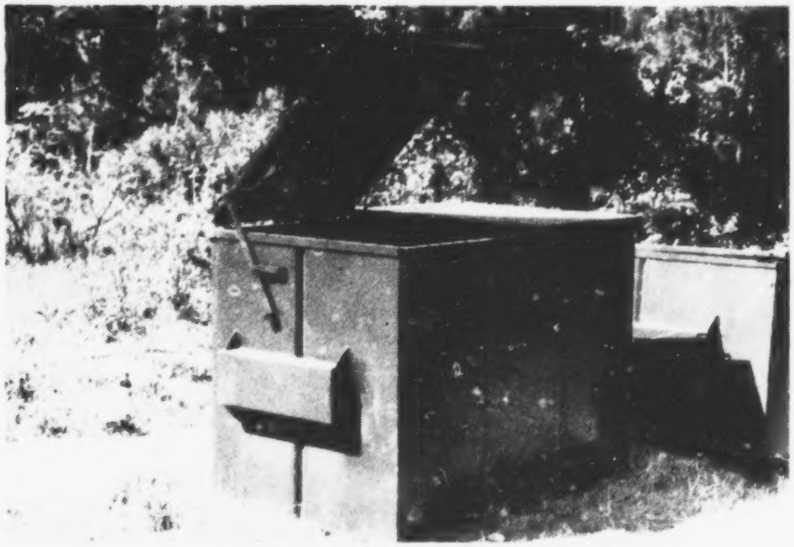


Figure 16. Three Cubic Yard Container

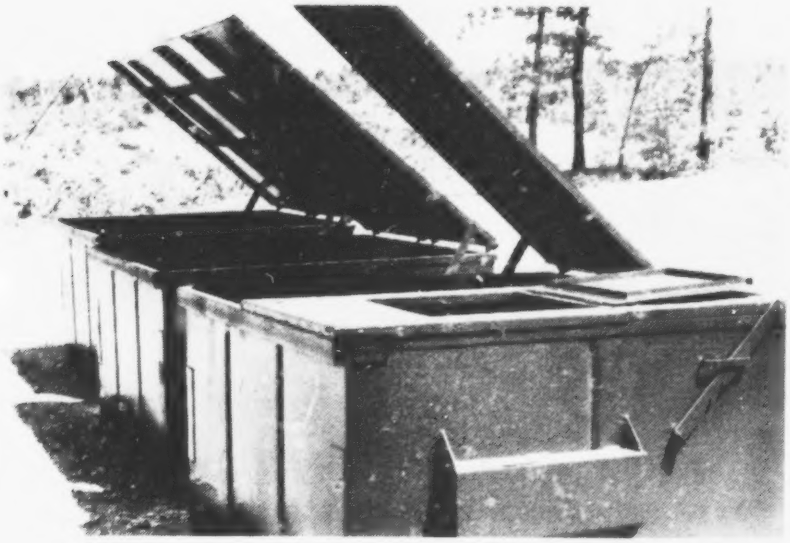


Figure 17. Four Cubic Yard Container

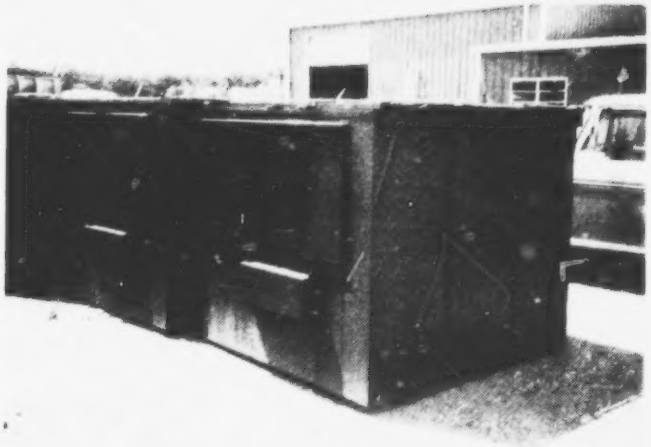


Figure 18. Six Cubic Yard Container

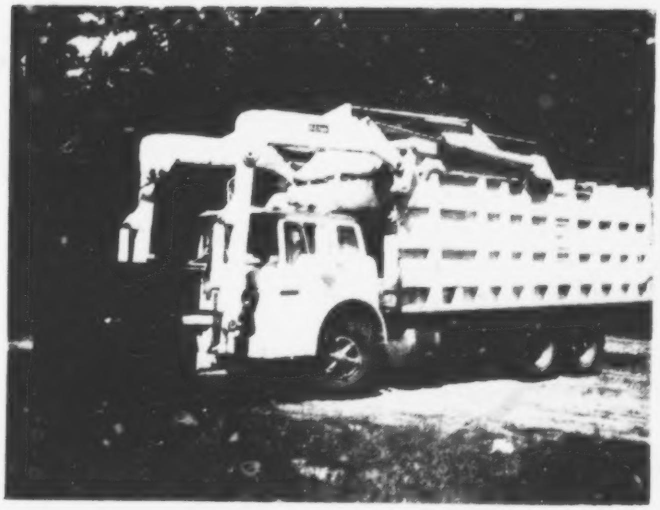


Figure 19. Thirty Cubic Yard Packer Truck

The truck upon which the packer unit is mounted is a heavy-duty, cab-over-engine Ford C-8000 model. The truck is powered by a diesel, caterpillar engine. Figure 19 is a photograph of the packer truck in the process of collecting wastes.

A third major piece of equipment purchased for the rural collection system was a telescoping, tilt-bed truck. A 1973, Ford F 7000 with a Caterpillar diesel engine was selected through competitive bidding as the chassis to be used. The tilt-bed is also equipped with a 50,000 pound winch and cable unit and a stake rack to give the truck maximum storage capacity.

One modification was made to the tilt-bed factory design: a boom hoist was constructed at the front of the bed. This placement enables the driver to pick-up an old refrigerator or other bulk material by threading the winch cable through the boom arm and swinging the arm to the side of the truck. Two different pick-up methods are demonstrated in Figures 20 and 21.

Training of Project Personnel

Personnel training concerned two levels of activity. Early in the planning stages of the program, the Project Director visited two counties: Lee County, Mississippi, and Chilton County, Alabama, where existing solid waste disposal systems had been initiated by county governments.

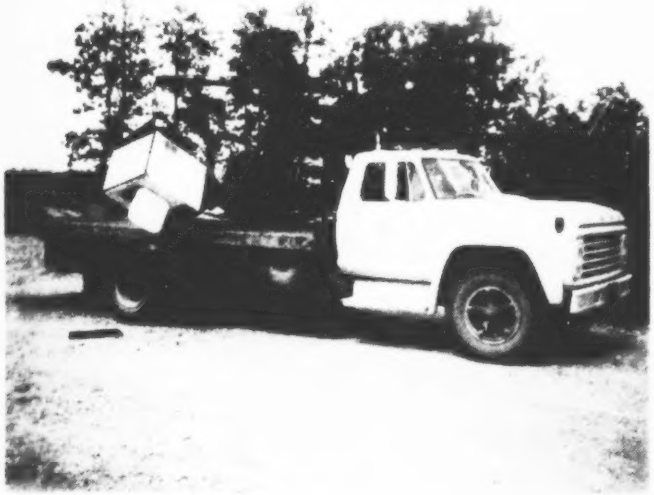


Figure 20. Flat-bed Truck-Side Pick-up

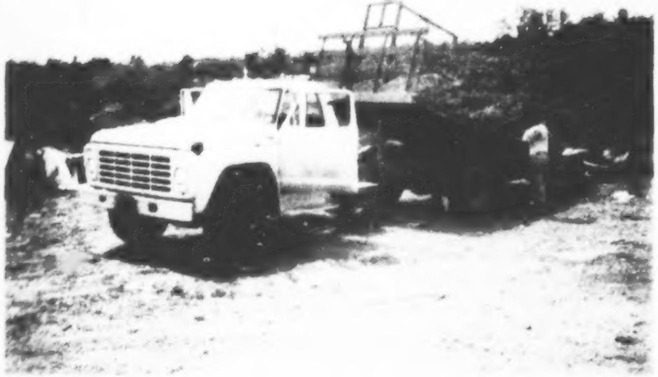


Figure 21. Flat-bed Truck-Rear Pick-up

A literature review was conducted which included studies of plans which had been accomplished for different types of systems.

Training of the sanitary landfill manager and other personnel was also accomplished. Before landfill operations were begun, the landfill manager attended an E.P.A. sponsored solid waste management course for operators in Kansas City, Kansas. No additional heavy equipment schooling was necessary because of the manager's prior operating experience. The manager subsequently instructed a back-up operator during a period of on-the-job training.

User Education

Landfilling operations actually began on June 4, 1973. This was after a period of user education stretching back to 1968. In 1968, the County Judge's office began efforts to find a solution to the County's trash problems. From 1968, until the time operations started, meetings were held with every Rural Community Improvement Group in the County. Informational sessions, showing either the Chilton County "Clean and Green"movie, or a slide presentation, or giving speeches by County Judge Randall Mathis, were presented to these R.C.I. Groups, all civic organizations, and all City Boards of Directors.

News media presentations were also used. Appendix C shows news articles that appeared during the planning stages of the program.

The slide presentation mentioned above was developed by the Project Director with technical assistance provided by Henderson State College Media Center. This program covered the County's trash problems and the proposed solution for both rural collection and disposal. Particular attention was given to showing the difference between a dump and a sanitary landfill and to showing precisely how a sanitary landfill is operated.

Construction at the Sanitary Landfill

The first construction activity was the clearing and grubbing of approximately 5 acres of the 27.7 acre site. This was accomplished with County Sanitation Department personnel and the International TD-15C tractor purchased for the landfill operation.

Interior road construction was accomplished by utilizing the landfill dozer for the rough shaping and ditch work. A scraper and a road patrol were rented from the County Road Department to spread gravel and accomplish the finish work on the road. Gravel is available in abundance on the 27.7 acre site, and this gravel was used to provide the surface for the all-weather interior access road for the landfill.

Other items of construction include an office building, scales, septic tank and filter field, water well, maintenance building, fence, and container pad. The office building was built to provide protection from the elements, sanitary facilities and drinking water for department personnel. The maintenance building was provided for dozer storage, small equipment storage, and an all-weather maintenance area. Figure 22 and 23 show the landfill office complex.

Selection of Container Sites

In a previous section of this Report, "System Design," a methodology was outlined whereby optimum container locations were selected. This "classroom" methodology resulted in a map showing preliminary container locations for the entire rural county.

Once this preliminary exercise was accomplished, County officials moved to involve the citizenry in container site selection. The procedure is outlined below.

The Project Director met with the County Agricultural Extension Agent, Mr. Dallas Holbrook, and his Assistant County Agent, Mr. L. J. Jackson, and identified the leadership of each rural community. From these names, two or three people from each community were selected by the County Judge to serve on a site selection committee for their individual communities. A total of approximately eighty

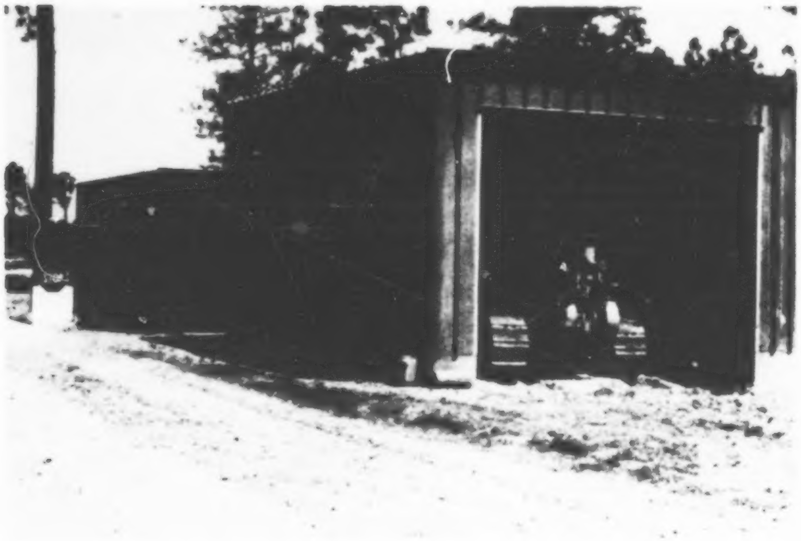


Figure 22. Scale House and Maintenance Building

Figure 23. Office Compound

people [illegible] (7[illegible] per cent) [illegible] continue

in the mountains [illegible]

Each committee was given [illegible]

[illegible] by the [illegible] the

[illegible] and [illegible]

would [illegible]. The committee [illegible] to

fill the [illegible] which the [illegible]

particular [illegible] to the

Judge.

In most [illegible]

of a [illegible] of [illegible]

[illegible]

limits was a function of [illegible].

Plant [illegible] that the time and effort

taken to [illegible] the city [illegible] was an

[illegible] per cent

of the [illegible]. The [illegible]

of [illegible]

[illegible]

[illegible]

rural citizens.

[illegible]

[illegible] to [illegible]

property [illegible] which the [illegible] base course was applied. The gravel base course was a mixture of clay with a gravel, [illegible] from [illegible] to 2 inches in diameter. The gravel was [illegible] [illegible] surface [illegible] [illegible] [illegible] as well as the surface.

There are [illegible] [illegible] [illegible] the [illegible] of the [illegible] the [illegible] [illegible] the [illegible] [illegible] would [illegible] [illegible] of [illegible] [illegible] would be completely [illegible] [illegible] Figures 26 and 27 [illegible] [illegible] improvements.

Dump Rehabilitation

The main rehabilitation [illegible] size and location [illegible]

The [illegible] the time it was [illegible] dump [illegible] is estimated that [illegible] 10,000-15,000 [illegible] A sketch map of the [illegible]

Volume of material [illegible] at the time of [illegible]

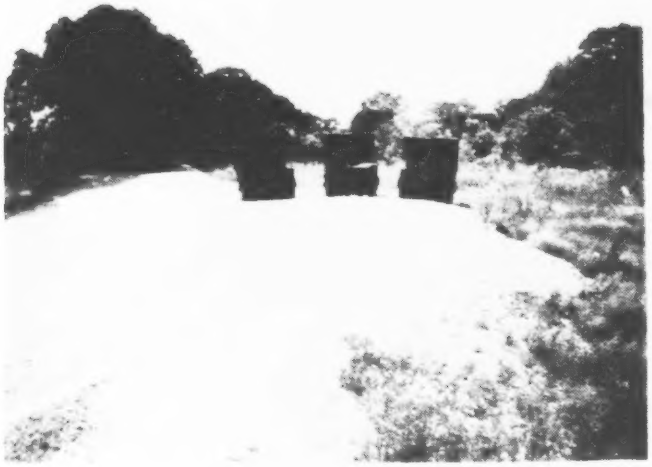


Figure 24. Container Site Improvement

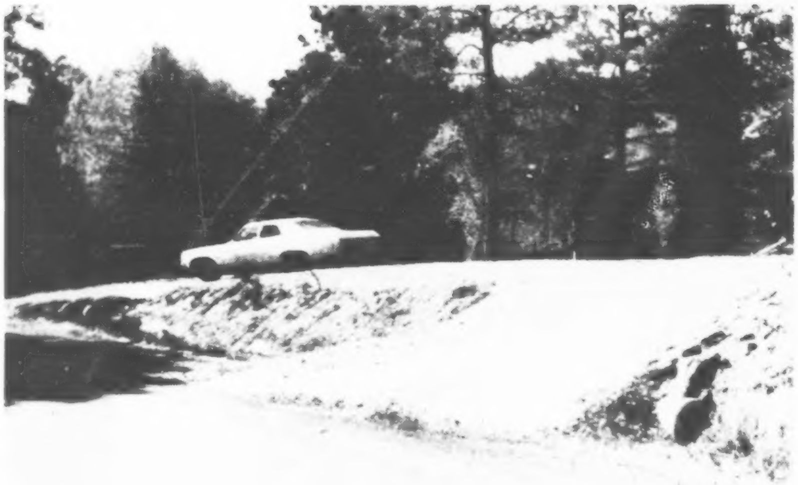


Figure 25. Container Site Improvement

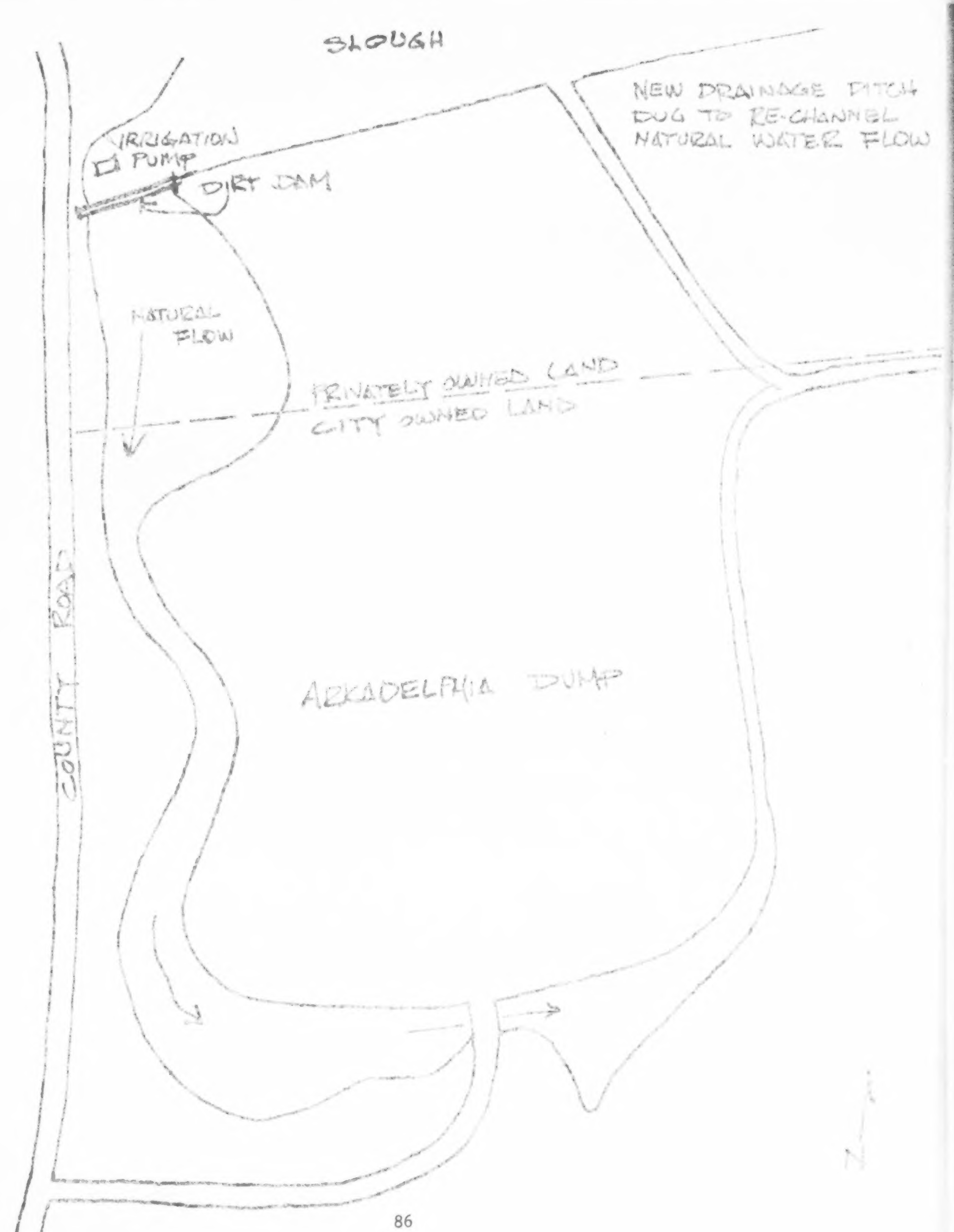

SLOUGH
NEW DRAINAGE DITCH DUG TO RE-CHANNEL NATURAL WATER FLOW
IRRIGATION PUMP
DIRT DAM
NATURAL FLOW
PRIVATELY OWNED LAND
CITY OWNED LAND
COUNTY ROAD
ARKADELPHIA DUMP
N

FIGURE 26.
SKETCH MAP OF OLD ARKADELPHIA DUMP

Figure [illegible]. [illegible] Area [illegible] - [illegible] View

Figure [illegible]. [illegible] Area [illegible] - [illegible] all waste from the City of Arkadelphia and surrounding area at the old dump. People in the rural areas around the City as well as some businesses, contractors and industry used the site for the five month period.

This move was made for two primary reasons. First, the five month period from October, 1973 to March of 1974 was an extremely wet time, and made it impossible to complete the dump closure. Secondly, there was such a mass of refuse to be moved or covered [illegible] within the the cost of renting a bulldozer. [illegible], was made to use the Sanitation Department's [illegible]. Transferring the TD-15C back and forth between the landfill and the dump (round trip approximately [illegible] miles) was an unnecessary logistics problem, not to mention an unnecessary cost.

Rat Extermination - Consultations with the State Health Department, Vector Control Section, resulted in a decision to use Red Squill poison mixed with hamburger meat.

The bait mixture was formulated by people from the State Health Department and [illegible] at the Arkadelphia dump. The bait was then distributed at the dump on March 11, 1974. Inspection of the bait the following morning showed that approximately 30-40% of the bait had been accepted.

The State Health Department's recommendation was to follow several days later with a baiting of Warfarin mixed with cornmeal. This was accomplished with satisfactory results.

Covering - Covering was accomplished by using some cover material at the site. The job was completed, however, by hauling overburden into the dump from one of the County's gravel pits.

All other dumps in the County were smaller in size and more remote. The State Health Department recommended that, because of the remote locations in relation to homes, an attempt not be made to poison any possible rat population. In all, twelve dumps have been compacted, covered, and officially closed.

RESULTS OF PROJECT OPERATIONS

Waste Operations

Weighing operations began at the Clark County Sanitary Landfill on March 7, 1974. The results obtained and reported in the following paragraphs are for an eight month period. This should be kept in mind in analyzing the results.

Municipal Waste Collection

Municipal waste as used in this section refers to waste generated in the City of Arkadelphia. Arkadelphia transports all of its waste to the sanitary landfill in two city owned front-loading compactor trucks.

Two units of time have been selected for data analysis, the week and the day. This was done to give readers the maximum amount of information with which to make comparisons with their own situations. It is possible to give data based upon the day as a unit of time since both the City of Arkadelphia and Clark County make collection runs each day.

During the eight month period, weekly collections from Arkadelphia ranged from 133,650 pounds to 219,780 pounds. The average amount of waste hauled was 182,971 pounds per week. This results in an average waste collection per person of 22.0 pounds per week or 3.1 pounds per day for the City of Arkadelphia.

Rural Waste Collection

Included in the rural analysis are five municipalities, Gurdon, Amity, Gum Springs, Okolona, and Whelen Springs, with an aggregate population of 3,317, as well as the rural non-incorporated areas which has a population of 8,379. These municipalities are included in the "rural" analysis since they have contracted Clark County to collect and dispose of their waste material

During the first eight month period of weighing, collections from rural areas ranged from 65,050 pounds per week to 117,510 pounds per week. The average weekly collection amounted to 92,464 pounds per week. These values result in an average waste collection per person of 9.6 pounds per week or 1.4 pounds per day.

Sanitary Landfill Weighing Operations

Statistics pertinent to the landfill operation have been presented in the previous sections. These statistics describe the majority of the wastes disposed of in the landfill. There are additional wastes deposited in the landfill which are brought there by trucks other than those of the County and City of Arkadelphia.

At this point in operations, only a minor, insignificant part is brought in by private citizens. These have averaged about one vehicle per day and have some type of bulk waste such as tree trimmings, old limbs, or old refrigerators

Additional quantities are brought in by the Corps of Engineers and the Arkansas Highway Department. During the eight month data period, the Corps of Engineers brought in 217,140 pounds of garbage. During the same period, the Arkansas Highway Department brought in 95,700 pounds of refuse.

Average weekly waste depositions in the landfill during the eight month weighing period was 212.0 tons per week. This averages 25 tons per day for a six day work week. Figures presented in this paragraph are county-wide waste disposal totals and represents a waste disposal average of 19.7 pounds per person per week or an average of 2.3 pounds per person per day.

Water Quality Study

An important element of the project has been the groundwater quality monitoring program in the area of the landfill project. This monitoring effort was conducted by Dr. Joe Nix of Ouachita University whose report is provided in full as Appendix D of this report. Conclusions drawn by Dr. Nix were that groundwater quality in the vicinity of the landfill was rather poor prior to initiation of operations at the landfill site.

Project Costs

Cost information is a key element of the project management information effort. This section presents actual equipment costs, construction costs, management information costs, operating costs, and dump rehabilitation costs.

Equipment Costs

All of the equipment purchases for this project were made in accordance with purchasing procedures outlined by Act 52, 1965 of the State of Arkansas. The costs shown in this section represent the results of competitive bid purchasing. Table 16 shows actual costs for equipment purchased for the landfill.

Table 16. SANITARY LANDFILL EQUIPMENT COST

Equipment	
1. Crawler tractor with landfill blade, all weather cab, rear cable controls and tool kit	$48,844.73
2. Truck scales, 60,000 pound capacity, installed	8,728.22
3. Office furnishings	499.97
4. Fuel Tank & Pump	378.42
5. Portable litter control fence	45.58
6. Steam cleaner and generator	1,440.14
TOTAL LANDFILL EQUIPMENT COST	$59,937.06

Four different items of equipment were purchased for the rural collection system. These were the thirty cubic yard compactor truck. containers, radios, and two tilt-bed trucks. Costs for this equipment is summarized in Table 17.

Table 17. RURAL COLLECTION EQUIPMENT COST

Equipment	Cost
1. Compactor truck, 30 yard, front loading, including packer body and tandem axle chassis	$29,047.36
2. Containers, 142 each includes: 100 four yard containers 22 six yard containers 20 three yard containers	34,146.71
3. Tiltbed truck, with stacke rack, 50,000 pound winch and cable, and hoist	12,435.78
4. Radios, mobile units, two each installed	1,462.60
TOTAL COLLECTION EQUIPMENT COST	$77,092.45

One explanation should be made concerning purchase of containers. Containers were purchased on three different occasions in lot sizes of 77, 26, and 39. The low cubic yard containers were purchased on three different occasions and unit costs ranged from $212.00 to $240.00. Unit price for the three yard boxes was $206.00 and for the six yard box was $262.00.

Landfill construction was a major implementation cost. For convenience, costs in this category have been summarized in Table 18. Total construction cost was $33,874.05.

Table 18. LANDFILL CONSTRUCTION COST

Item	Cost
1. Building and Facilities Office/ Maintenance Building, Fence, sign and water well	$16,936.98
2. Utilities	
Phone installation and line	182.00
construction power extension .5 mile	1,234.93
3. Site Preparation	
Site clearing and grubbing, six acres	1,828.06
Interior road construction, all weather gravel	1,092.08
4. Exterior roadway 2.5 miles	12,600.00
Total landfill construction cost	$33,874.05

Another element of the grant project was a management formation program. Costs associated with this element of the project are summarized in Table 19. Landfill engineering design costs have been included in Table 19. However, engineering costs should be considered as an element of total landfill development.

Table 19. MANAGEMENT INFORMATION COST

Item	Cost
1. Salaries, Project Director and Secretary @ 18 months	$18,500.00
Salary burden	2,943.00
2. Consultant services	
Site design	2,925.00
Water quality	2,250.00
3. Travel, landfill manager's course	218.41
4. Publications	
Final brochure	4,700.00
Final report	800.00
Slide/tape program	500.00
Total management information cost	$32,836.41

Sanitary Landfill Operating Costs

Table 20 and 21 show monthly operating costs and production statistics for the landfill and collection system respectively. As of October 31, 1974, only eight months of weight data had been obtained. Weighing operations began on March 7, 1974.

The reader should note that operating expenses for the landfill, as shown in Table 20, include a depreciation reserve and debt service requirement. Depreciation represents straight-line depreciation of scales, office building and landfill dozer. The debt service element represents the amount required on a monthly basis to amortize $68,700.00 in revenue bonds, at 5 per cent interest, for a 10 year period.

Operating expenses for the rural collection system, as shown in Table 21, includes containers. However, there was no debt service reserve established for the collection system since the equipment was purchased with an appropriation of Federal Revenue Sharing money.

Table 20. STATISTICS FOR MARCH 1974 THROUGH OCTOBER 1974: CLARK COUNTY SANITARY LANDFILL

	SUMMATION OF MONTHLY TOTAL	AVERAGE OF MONTHLY TOTAL
Refuse Disposal (Tons)	5,042.4	630.3
Man Hours Employed	1,576.0	197.0
Machine Hours Employed	771.5	96.4
Labor Wages	9,099.66	1,137.45
Printing and Duplication	19.98	2.49
Expendable Office Supplies	0.00	0.00
Telephone	0.00	0.00
Lease or Purchase of Equipment	42.21	7.04
Contract Services - Equipment Maintenance	642.57	80.32
Gas and Oil, Equipment	688.07	86.00
Insurance, Equipment	600.00	50.00*
Insurance, Buildings and Grounds	94.00	7.83*
Utilities	16.76	2.09
Contract Service - Repair and Maintenance Buildings and Grounds	499.35	62.41
Lease or Purchase - Buildings and Grounds	277.00	23.08*
Purchase of Materials	156.96	19.62
Miscellaneous	11.97	1.49
Depreciation	4,749.28	593.66
Debt Service	5,933.28	741.66
Total Costs	$22,831.09	$2,815.14

EFFICIENCY RATIOS FOR ENTIRE PERIOD

Labor: (Man Hours/ton)	0.31
Equipment time: (Machine Hour/tons)	0.15

UNIT COSTS FOR ENTIRE PERIOD

Labor: ($/ton of refuse	1.80
Operating Overhead ($/ton of refuse	2.72
Total Cost ($/ton of refuse)	4.52

*These monthly averages are based upon a full 12 month period rather than six months.

Table 21. STATISTICS FOR MARCH 1974 THROUGH OCTOBER 1974 RURAL WASTES COLLECTION ACTIVITIES

	SUMMATION OF MONTHLY TOTAL	AVERAGE OF MONTHLY TOTAL
Refuse Collected	1,639.5	204.9
Man Hours Employed	2,069.0	258.6
Labor Costs	8,588.05	1,073.50
Printing and Duplication	0.00	0.00
Expendable Office Supplies	0.00	0.00
Telephone	0.00	0.00
Lease or Purchase of Equipment	275.45	34.43
Contract Services - Equipment Maintenance	1,894.87	236.85
Gas and Oil, Equipment	1,821.17	227.64
Insurance, Equipment	372.00	31.00*
Insurance, Building and Grounds	0.00	0.00
Utilities	0.00	0.00
Contract Services - Repair and Maintenance, Buildings and Grounds	0.00	0.00
Lease or Purchase - Buildings, Grounds	0.00	0.00
Purchase of Materials	1,772.96	147.74
Miscellaneous Expenses	0.00	0.00
Depreciation	4,530.64	566.33
Debt Service	0.00	0.00
Total Costs	$19,255.14	$2,317.49

EFFICIENCY RATIOS FOR ENTIRE PERIOD

Labor: (Man hour/ton)	1.26

UNIT COSTS FOR ENTIRE PERIOD

Labor: ($/ton of refuse)	5.23
Operating Overhead: ($/ton of refuse)	6.50
Total Costs ($/ton of refuse)	11.73

*This monthly average is based upon a full 12 months period rather than six months.

Dump Rehabilitation Costs

Cost data contained in this section pertain primarily to costs directly associated with closing the Arkadelphia City Dump. Reference should be made to the narrative on "dump rehabilitation" in the section of this report titled System Implementation.

Costs have been presented in Tables 22 through 26 and arranged two ways, according to Cost Category and according to Work Task. Total cost of closing the Arkadelphia dump was $4,126.56.

Several comments should be made concerning the listed dump closing costs. These are noted as follows:

1. The problem of water drainage injected a cost that might not be common to other dumps.
2. An inordinate amount of time was spent at this dump because two functions were actually taking place:
   (a) normal landfilling activity, and
   (b) covering the existing dump.
   The assumption can be made that had effort been concentrated upon preparation for closing, the total time required could have been reduced from 410 hours to about 160 hours.
3. Some materials and equipment were available at no cost. These were as follows:
   (a) the water pump was loaned to the department by an adjacent landowner;
   (b) the poison and rat bait was provided free of charge by the Health Department;
   (c) the TD15-C tractor used in the spreading, compacting, and covering tasks was Sanitation Department equipment.

The remaining eleven smaller dumps in the County cost a total of $2,611.80 to compact, cover and close.

Table 22. COST SUMMARY
ARKADELPHIA, ARKANSAS DUMP CLOSING

I.	Personnel		
	1. Wages	$1,435.00	
	2. Benefits	223.39	
	3. Contract Labor	533.39	$2,191.78
II.	Equipment		1,240.00
III.	Fuel and Materials		694.78
	TOTAL DUMP CLOSING COST		$4,126.56

Table 23. ARKADELPHIA DUMP CLOSING BY WORK TASK

I.	Drainage Improvement		
	A. Personnel		
	1. Crane Operator 40 hrs @3.25	$ 130.00	
	2. D-7 Dozer Operator 33 hrs @3.75	123.75	
	3. Dump Truck Driver 4 hrs @2.74	10.96	
		$ 264.71	
	B. Equipment		
	1. D-7 Dozer 33 hrs @13.00	$ 429.00	
	2. Dragline 40 hrs @11.00	440.00	
	3. Tractor 12 hrs @1.75	21.00	
	4. Pump 12 hrs @n/c		
	5. 5 yd. Dump Trucks 20 hrs @5.00	100.00	
	Total Equipment	$ 990.00	
	Total Drainage Improvement		$1,254.71

II. Preparation

A. Data Collection	$ 153.60	
B. Spreading & Compacting		
1. Personnel		
a. Dozer Operator		
380 hrs @3.50	1,330.00	
b. Benefits		
93% of 223.39	207.75	
2. Fuel		
380 hrs @4.8 gal/hr 1824 gal. @.26/gal	474.24	
3. Interior Road Improvement (gravel 150 yd.@1.00)	150.00	
4. Equipment		
a. D-6B 6 hrs @10.00	60.00	
b. TD-15C @N/C*		$2,375.59
C. Covering		
1. Personnel		
a. Dozer Operator		
30 hrs @3.50	$ 105.00	
b. Benefits		
7% of 223.39	15.64	
c. Contract Labor Truck Drivers		
28 hrs @4.99	115.08	
2. Fuel		
30 hrs @4.8 gal/hr. 144 gal. @.26 gal.	37.44	
3. Equipment		
a. TD-15C @N/C	-0-	
b. 15 yd. trucks		
20 hrs. @9.50	190.00	
Total Covering Cost		$ 463.16

III. Miscellaneous

A. Materials		
1. Chain and Locks	28.36	
2. Concrete	4.74	
Total Miscellaneous		$ 33.10
TOTAL DUMP CLOSING COST		$4,126.56

Table 24. PERSONNEL COST
ARKADELPHIA DUMP CLOSING

I. Personnel		
A. Dozer Operator/Manager 410 hrs @3.50		$1,435.00
B. Contract Labor		
1. Crane Operator 40 hrs @3.25	$130.00	
2. D-7 Dozer Operator 33 hrs @3.75	123.75	
3. Dump Truck 4 hrs @2.75	10.96	
4. Labor	153.60	
5. Truck Drivers 7 ea. 28 hrs @$4.11	115.08	533.39
Total Personnel		$1,968.39
II. Benefits for Non-contract Labor ($1,435.00)		
A. Social Security @.0585		83.94
B. Retirement @.07		100.45
C. Insurance @27.21/mo/employee		58.42
D. Total Salary Burden		$ 238.81
III. TOTAL PERSONNEL COST		$2,207.20

Table 25. EQUIPMENT COST
ARKADELPHIA DUMP CLOSING

I.	Dozers	
	A. International TD15C	
	B. D-7 Caterpillar	
	33 hrs @13.00	$ 429.00
	C. D-6B	
	6 hrs. @10.00	60.00
II.	Dragline 40 hrs @11.00	440.00
III.	Dump Trucks	
	A. 15 yd. trailer 20 hrs @9.50	190.00
	B. 5 yd. dump trucks 20 hrs @5.00	100.00
IV.	Other	
	A. Tractor, wheeled 12 hrs @1.75	21.00
	B. Pump 12 hrs @n/c	
	TOTAL EQUIPMENT COST	$1,240.00

Table 26. FUEL AND MATERIALS COST
ARKADELPHIA DUMP CLOSING

I.	Fuel, Diesel		
	A. 410 hrs. @4.8 gal/hr. 1968 gal @.26/gal.		$ 511.68
II.	Materials		
	A. Cover Material @n/c		
	B. Gravel 150 cu yd @1.00	$150.00	
	C. Chain and Lock	28.36	
	D. Concrete	4.74	
	E. Rat Poison	N/C	183.10
	TOTAL FUEL AND MATERIALS		$ 694.78

APPENDICES

APPENDIX A. Site Geological Analyses

1. Cedar Grove Site
2. Manchester Site

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE
LITTLE ROCK, ARKANSAS 72209

501 371-1701 GEN. OFF.
501 371-1136 AIR DIV.

May 15, 1972

MEMORANDUM TO: Sidney Fitzgerald, Sanitary Engineer

SUBJECT: Geologic Reconnaissance
Cedar Grove Area, Clark Co., Arkansas

The Cedar Grove area, under consideration as a sanitary land fill site, consists of about 80 acres in portions of the NE1/4 section 34 and NW 1/4 section 35 T6SR20W Clark County, Arkansas. The area is mostly located on a Borrow area controlled by the Corp of Engineers.

The site is located on exposed rocks of either lower Ozan or upper Brownstown formations of Upper Cretaceous Age. The basal Brownstown in turn rests unconformably upon rocks of Paleozoic Age. The Paleozoic rocks are probably Stanley shale or Jackfork sandstone.

These Upper Cretaceous rocks are striking East 10 degrees south and dip south some 6 to 8 degrees. Within these rocks are at least 3 sandstone beds of varying degrees of purity and thickness. These 3 sandstone beds are more or less exposed east-west over the entire borrow area. The sandstones are very fine to medium grain, tan to bluish, soft, friable and havegood porosity and permeability. These sands must be considered as aquifers or potential aquifers and with the elevation and dip the site is undoubtably a re-charge area.

If this site is used as a sanitary landfill, some means must be provided to protect these sands from pollution.

C. W. Crowson
Geologist

CW:dh

These three areas have small areas of seeps at elevations of about 300 feet above sea level. These areas may be wet weather seeps and are probably associated with drainage along the sand-gravel cap of the surrounding hills. The flow, after accumulation, is small and seems to go underground at about the valley fill elevation of about a +270. There are probably more unobserved seeps at the base of the gravel-sand cap but were not observed.

The run-off of rainfall will be southeast into L'Eau Frais Creek which in turn drains south west into the Ouachita River. Drainage from the site to the Ouachita River is in excess of 8 miles.

Stream gradient, from the hilly drainage divide to the rather flat bottom lands to the east and south, is rather steep and averages about 200 feet per mile. The gradient of this bottom lands or the L'Eau Frais Creek to its termination only varies from about 225 feet to 165 feet or an average gradient of less than 10 feet per mile.

Soils:

The Manchester site lies upon soils derived from the weathering of terrace deposits and the under lying Wilcox clays and sandstone. The hills are capped with sands and gravels that are the remains of terrace deposition, but are not considered clean or thick enough to be of commercial importance. The soils will be thicker in the valleys but are rather well preserved along the hillsides. The soils, generally speaking, are somewhat sandy and exhibit good drainage characteristics. Beneath the soils are materials composed chiefly of sand clay which may contain various percentages of sand. The sands have a wide range of purity and are probably lenticular in nature.

Geology:

The entire area overlies the Wilcox formation of Eocene age. The Wilcox is composed of a series of finely laminated sandstone and clay containing beds, usually thin and impure, of lignite. The formation ranges from 0 to 600 feet in thickness. Here the formation is in excess of 100 feet thick and appears to be composed mostly of sandy clay. Thin lenses of sand can be present but are considered to be lenticular instead of sheet. These lenses have porosity and permeability and may be quartztic in places. These sandstones, under correct conditions, could be a limited source of domestic water during the wetter years. Although no apparent bedding planes were noted, it is believed that the Wilcox strata strike northeast-southwest and dip gently to the southeast. Surface drainage, east of the divide, is to the southeast and then southwest but the sub-surface movement of ground water is southeast.

Remarks:

If this site is approved then the following should be considered.

A. No fill should be west of the drainage divide.

B. Although the local valley water table appears to be 263 above sea level, no fill should be located lower than 270 feet nor a cut be made lower than this sea level datum.

C. The sand-gravel cap, where present, should be removed prior to compacting.

D. The site should be engineered so that all surface drainage can be diverted or be non-existant.

E. Cover material is adequate but may require mixing when abnormal amounts of sand and or lignite are encountered.

F. Trench fill and buffer zones around and below the seeps.

C. W. Crowson
Geologist

CWC:ab

APPENDIX B. Attorney General's Opinion

OFFICE OF
The Attorney General

Ray Thornton
ATTORNEY GENERAL

JUSTICE BUILDING
Little Rock, Arkansas
72201

RECEIVED
APR 21 1972

April 20, 1972

Judge Randall Mathis
County Judge
Clark County Courthouse
Arkadelphia, Arkansas 71923

Dear Judge Mathis:

This is in response to your inquiry in which you ask the following questions:

(a) Under Acts 237 and 238 does a County Judge have the authority to collect fees or charges to support a solid waste management system?

(b) If yes, what is the mechanism that the law provides for collecting such fees or charges?

(c) If payments become delinquent, what means does a County Judge have available to enforce collection of the fee or charge?

In reply to your first question please note Ark. Stat. Ann. §82-2706(b) (Act 237 of 1971), provides as follows:

> The County Court shall have the authority to levy and collect such fees, charges and require such licenses as may be appropriate to discharge the County's responsibility for a solid waste management system or any portion thereof. Such fees, charges and licenses shall be based on a fee schedule contained in an order of the County Court.

Note also the following portion of Ark. Stat. Ann. §82-2719 (Act 238 of 1971):

> (a) Counties and municipalities are hereby authorized to impose and collect rates and charges for the services provided by projects of the type authorized by this Act [§§82-2713 -- 82-2726] whether or not acquired, constructed, reconstructed, extended and/or improved under the authority of this Act.

APR 21 1972

> (b) Counties and municipalities are hereby authorized to impose upon and collect from all persons who can be served by a project reasonable rates and charges for the services of the project, without regard to whether such person desires to utilize the services.

In reply to your second question please note that no particular mechanism of collection of the fees by the County is set forth in Acts 237 and 238 of 1971.

A system of collection could be set up so that the bills for such collection could be sent out with the property tax bill to all owners of realty. Such system would be limited in that it would entail billing people who do not use the system and would fail to reach others who do use the system. Also such an approach would enable only an annual billing. Note also that such fee would not be a lien upon the land as would be the property tax.

Perhaps an alternative method would be a system of billing of all persons who use the county disposal system. Note also that Ark. Stat. Ann. §82-2719, set forth above, does not require that a person desire to use the system to enable the governing system to charge for such use, if available.

In reply to your third question note that, as stated above, there is no provision for the delinquent fees for such a system to become a lien on the land of the person owing such fee. Therefore, any delinquent fees would constitute a debt owed to the county, and as such could be collected by the prosecuting attorney by appropriate legal actions.

Yours very truly,

RAY THORNTON
Attorney General

By: ROBERT H. CRANK
Assistant Attorney General

RHC:sf

APPENDIX C. News Articles

Every Day More and More People Read the

Daily Siftings Herald

ASSOCIATED PRESS 12 PAGES ARKADELPHIA, ARKANSAS THURSDAY EVENING, APRIL 27, 1972 SINGLE COPY 10 VOLUME 51 NUMBER 113

County Studying Comprehensive Solid Waste Disposal

The comprehensive solid waste disposal plan for Clark County is in the process of being presented to the people of the county and each city. The planning of the Solid Waste Management Program has been a joint City-County effort. When implemented, the Solid Waste Management Plan will be a joint effort with each city and the County participating in the program.

According to Clark County Judge Randall Mathis, the plan calls for a highly supervised sanitary landfill and a comprehensive County-wide collection service utilizing a number of mechanically serviced box-type refuse containers.

The landfill will not be an open pit type of dumping. The sanitary landfill is defined by the American Society of Civil Engineers as "A method of disposing of refuse on land without creating nuisances or hazards to public health and safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and cover it with a layer of earth at the conclusion of each day's operation, or at more frequent intervals as may be necessary."

The sanitary landfill plan set up for the county will consist of five basic operations. They are weighing each truck entering the site and recording the weight and source; depositing the wastes in a controlled manner in a prepared portion of the site; spread and compact the waste; covering of the waste daily or more often and compacting the cover material daily.

The management plan for the landfill calls for a staff of three employees. One will be a full-time dozer operator and one will act as landfill manager. The landfill manager will control access into the site, conduct the weighing of trucks, and keep records of weights and sources of refuse. The third is an assistant operator who will provide the back-up for the dozer operator and the compactor truck driver.

The comprehensive collection service will be provided by two agencies. The City of Arkadelphia will provide a collection service to rural areas and provide a container transfer service for refuse generated in each of the other towns in the county. The county collection service will not be a door to door collection service. It will utilize the system of containers placed in strategic points in the county. Containers will also be provided in the towns of Gurdon, Amity, Whelen Springs, Okolona and Gum Springs. This will allow the citizens of these towns to place their refuse in boxes rather than utilizing the open dump sites now in use. These green box containers will be serviced a minimum of twice weekly.

It should be emphasized that the objective of the solid waste management program is to eliminate open dumping, the burning of dumps and to reclaim the existing open dump sites.

Judge Mathis stated that meetings were being set up for the various community groups to explain the plan, to give more details and to answer citizens' questions about the program. The second of these meetings will be held Friday, April 28, at 7:30 p.m. in the DeGray Church in the DeGray Community.

Daily Siftings June 19, 1973

Citizens Apparently In Dark About Solid Waste Disposal

By ED LOWTHER
Of The Herald Staff

The beginning of Arkadelphia's solid-waste program has been postponed nearly three months but its delay seemingly has done little to increase residents' knowledge about the program.

"I really don't know enough (about the program) to give an opinion on it," said Mac Tatman, a real estate agent here. "As for the price, I have no qualms about the fee. My only question is where are they going to put the pick-up station," Tatman said in reference to the downtown garbage collection. "If it is handy, that's fine. If we have to go a block or two, that's something else."

Tatman's "don't know" answer was a standard reply among those questioned about the program. Another downtown businessman, Jim Askew of Heritage, Ltd., knew even less about the program.

"The general concept is a good idea," said Askew, "but I have no idea what it is going to cost me and I haven't been contacted by the city about it." All businesses were supposed to have received a letter from the city offices stating a monthly collection fee.

Although Askew liked the concept, he said "one man is complaining because his (collection rate) is going to be three times more than it was in the past."

Col. John T. Berry, superintendent of maintenance at Ouachita Baptist University, also said he did not have enough information to form an opinion, but added, "I have seen it operate in other places and it seems to be very efficient."

One businessman who is better-informed about the program than most is looking forward to its initiation. John Marbury, manager of the Minute Man restaurant, believes the pick-up will aid in cleanliness.

"We're using barrels now, (opposed to the metal containers the city will use) and it's hard to keep trash in them. They're always leaking and rotting out. For just $10 more then we're paying now, I'll be glad to see it come in, if they're regular," said Marbury

Where the city businessmen do not have much knowledge of the program, residents appear to have even less.

"I don't have any idea about it," said Dr. Randolph Quick. "I don't know what the city is going to do except pick up the garbage. I guess they'll probably hire the same guys who have been doing it."

Other residents said they also didn't know much about the program. They said they didn't know whether it would be much different than the private hauling they are having done now. One lady, who asked to remain anonymous, said she had heard complaints about the program.

"Most people are kind of upset because (the city hasn't) started it faster. The other people who have been doing the hauling for them are slacking up and not picking up regularly," she said.

On her own part, she said she'll be glad to see the program start.

"I think if the city can get it operating like they think they can, it will be pretty good."

Compactor Truck Ready: May Be Here By Friday

EDITOR'S NOTE— The city manager's office is preparing daily status reports on the solid waste program until it begins. This is the second such report.

As pointed out in previous releases, the big compactor truck is the heart of the proposed solid waste collection system for Arkadelphia. Within the system it is known as the "Mother Truck."

In concept, pick up trucks pull trailers-trains through the residential area collecting trash. When the trailers are full, the employees radio the Mother truck to meet and empty the trailers. The Mother truck also empties the many containers placed in the central business district and the outlying business areas.

From this explanation it is easy to see just how important the mother truck is. No matter how many trailers or containers we have on hand, the system depends on the big compactor to empty them and get the solid waste to the landfill.

With so much depending on this one vehicle, the city has continued to monitor its progress closely. At 11:45 A.M. June 18, the plant at Durant, Oklahoma was called. The information was that the truck was assembled and painted. When the new tire arrives in Durant on Wednesday or Thursday, the paint will have had the necessary two days drying time and the truck should be dispatched to Arkadelphia. It is hoped that, barring unforseen delays, the truck will arrive on Friday, June 22.

ARKANSAS: Scattered showers and thunderstorms today and tonight, mainly north sections. Showers ending from the west Wednesday. Mostly cloudy and not as warm today and tonight. Decreasing cloudiness and cooler Wednesday. Highs today upper 80s to low 90s. Lows tonight mid 60s to near 70. Highs Wednesday mostly in the 80s.

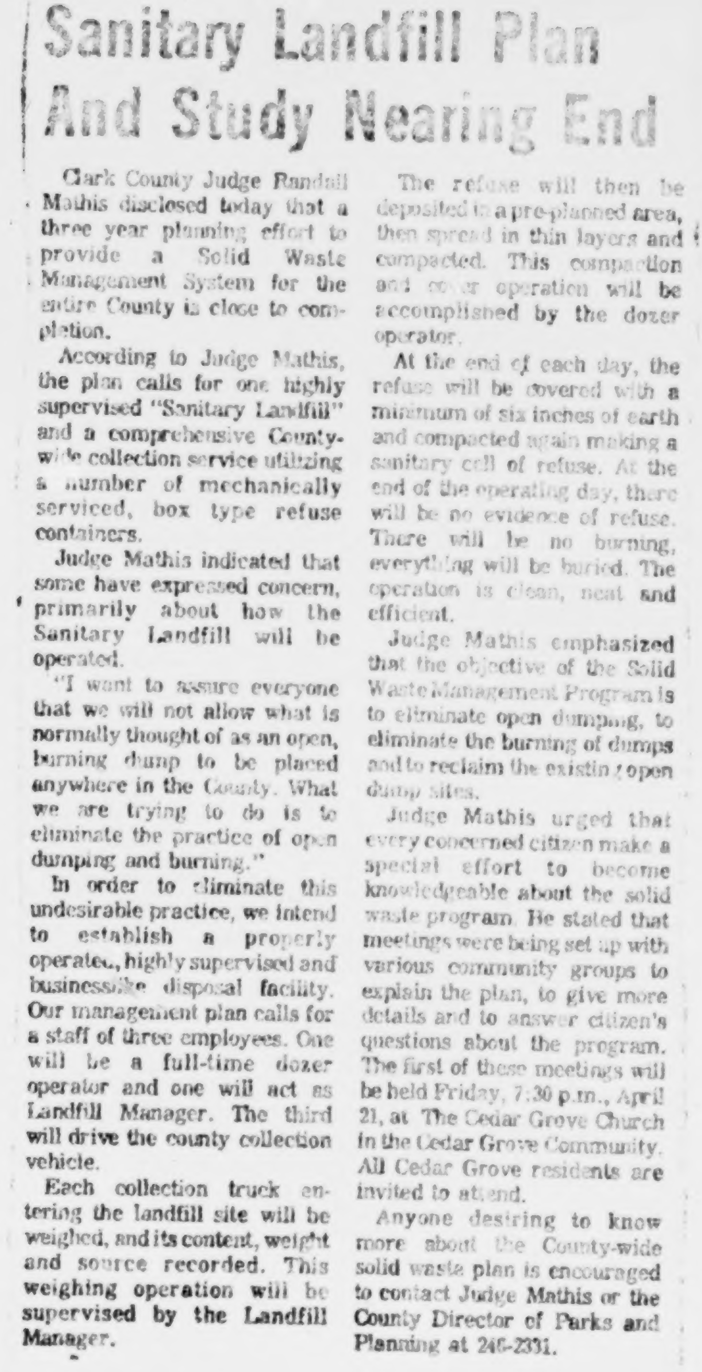
Herald!

Boyce Harred
City Manager

Dear Boyce:

The "Mother Truck." Ah! Come on.

Yours,
Clark



Sanitary Landfill Plan And Study Nearing End

Clark County Judge Randall Mathis disclosed today that a three year planning effort to provide a Solid Waste Management System for the entire County is close to completion.

According to Judge Mathis, the plan calls for one highly supervised "Sanitary Landfill" and a comprehensive County-wide collection service utilizing a number of mechanically serviced, box type refuse containers.

Judge Mathis indicated that some have expressed concern, primarily about how the Sanitary Landfill will be operated.

"I want to assure everyone that we will not allow what is normally thought of as an open, burning dump to be placed anywhere in the County. What we are trying to do is to eliminate the practice of open dumping and burning."

In order to eliminate this undesirable practice, we intend to establish a properly operated, highly supervised and businesslike disposal facility. Our management plan calls for a staff of three employees. One will be a full-time dozer operator and one will act as Landfill Manager. The third will drive the county collection vehicle.

Each collection truck entering the landfill site will be weighed, and its content, weight and source recorded. This weighing operation will be supervised by the Landfill Manager.

The refuse will then be deposited in a pre-planned area, then spread in thin layers and compacted. This compaction and cover operation will be accomplished by the dozer operator.

At the end of each day, the refuse will be covered with a minimum of six inches of earth and compacted again making a sanitary cell of refuse. At the end of the operating day, there will be no evidence of refuse. There will be no burning, everything will be buried. The operation is clean, neat and efficient.

Judge Mathis emphasized that the objective of the Solid Waste Management Program is to eliminate open dumping, to eliminate the burning of dumps and to reclaim the existing open dump sites.

Judge Mathis urged that every concerned citizen make a special effort to become knowledgeable about the solid waste program. He stated that meetings were being set up with various community groups to explain the plan, to give more details and to answer citizen's questions about the program. The first of these meetings will be held Friday, 7:30 p.m., April 21, at The Cedar Grove Church in the Cedar Grove Community. All Cedar Grove residents are invited to attend.

Anyone desiring to know more about the County-wide solid waste plan is encouraged to contact Judge Mathis or the County Director of Parks and Planning at 246-2331.

APPENDIX D. Water Quality Study

WATER QUALITY SURVEY IN THE VICINITY OF THE CLARK COUNTY, ARKANSAS, SANITARY LANDFILL

by

J. Nix
Department of Chemistry
Ouachita Baptist University
Arkadelphia, Arkansas 71923

and

Clark County, Arkansas

for the

Office of Solid Waste Management Program
ENVIRONMENTAL PROTECTION AGENCY

Project No. S-801760

January 1974

EPA Review Notice

This report has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement of recommendation for use.

ABSTRACT

The Clark County, Arkansas, sanitary landfill became operational July 5, 1973. A water quality survey of ground and surface water in the vicinity of the operation was conducted from January 1973 through December 1973. Representative samples were taken four times prior to the beginning of operation and six times after the project became operational.

The results of the study indicate that the quality of the surface water in the vicinity of the landfill operation is consistent with that found throughout the alluvial section of Arkansas. Two domestic wells were found to contain relatively high concentrations of chloride and nitrate, This condition was found to be present prior to operation of the landfill and thus could not be attributed to the operation of the landfill. Although fecal coliform were detected in both ground and surface water, the presence of these organisms could not be attributed to the operation of the landfill since they were found both upstream and downstream from the drainage from the operation.

SECTION I

CONCLUSIONS

Surface water in the vicinity of the Clark County Sanitary Landfill was sampled at four locations during 1973. Results of this survey indicate that the quality of surface water in the study area is consistent with that expected for a lowland stream of the alluvial section of Arkansas. Surface water contains a moderately low concentration of dissolved species but does show relatively high iron concentrations due to the presence of humic acids.

Comparison of water quality parameters at stations located upstream from the drainage of the landfill operation and those downstream do not indicate that surface drainage from the operation is significantly changing the quality of the stream. The intermitent drainage located within the boundary of the landfill did not indicate the presence of constituents which could be attributed to the operation of the landfill. Elevated values of fecal coliform were found both above and below the drainage from the landfill operation, thus could not be attributed to operation of the facility.

As determined from the two domestic wells and one spring sampled in this study, the ground water of this area is not of extremely high quality. Data indicate that there is some salt water [illegible] into the wells, and that nitrate is also being introduced into the wells either from natural sources or from septic tank seepage. Fecal coliform were found to be present in both the wells and spring during several of the sampling periods.

The data indicate that the infecting nature of the ground water in this area was established [illegible] of the operation of the landfill, [illegible] to the landfill.

Nitrate values in one of the wells [illegible] exceeded public health standards [illegible] by water contaminated with nitrate [illegible] serious health problem to infants consuming the water. Steps should be taken to inform users of this well [illegible] situation.

The design of a water quality monitoring program in the vicinity of a sanitary landfill operation [illegible] should give consideration to the following [illegible] (1) The possible use of chemists and microbiologists working in the same locality, possibly from local colleges and universities. Utilization of such personnel should allow the study team to maintain closer surveillance over the facilities as well as permit more frequent sampling. (2) [illegible] baseline data on surface and subsurface waters should be gathered for a considerable time prior to beginning of the operation. (3) Sampling sites should be chosen to [illegible] the most likely aquifers to be contaminated as well as those located physically close to the operation, and (4) The initial phase of the program should allow for the determination of as many parameters as possible in order to aquaint the investigator with the particular system.

CHAPTER [illegible]

RECOMMENDATIONS

It is recommended that a [illegible] ground and surface water [illegible] County Sanitary Landfill [illegible] scale. For a modest [illegible] selected water quality parameters [illegible] by the county and [illegible] sanitary landfill. Parameters which [illegible] measured and which would [illegible] pollution would be pH, [illegible] ductance, nitrate, ammonia [illegible].

Instrumentation which would be [illegible] of the constituents listed above with the exception of BOD is relatively inexpensive and [illegible] operate. [illegible] of Ouachita University [illegible] training personnel in the [illegible]. It is suggested that [illegible] University [illegible] mended that data collection [illegible] by personnel of the [illegible] Ouachita Baptist University.

Some attempt should be made [illegible] high nitrates in domestic wells [illegible].

SECTION XII

INTRODUCTION

The Clark County Sanitary Landfill is located approximately 10 miles east of Arkadelphia, Arkansas, and two and one half miles north east of the [illegible] community. The [illegible] acre site is located on the upper slopes of a ridge above the L'Eau Frais Creek. The average elevation of the site is [illegible] feet (msl). The elevation of this area [illegible] ranges from a maximum elevation of approximately [illegible] feet (msl) to around [illegible] feet (msl) over a distance of [illegible] miles.

Forest cover in the vicinity of the landfill is principally a mixed type consisting of pine and hardwoods characteristic of the alluvial section of Arkansas. Site preparation began on June 1, 1973. The site became operational on July 5, 1973.

The principle drainage of the area is L'Eau Frais Creek which flows in a southeasterly direction at a point approximately one half mile from the site of the landfill. Two intermittent feeder streams drain the area adjacent to the landfill operation and flow eventually south to L'Eau Frais Creek.

Sub-surface movement of ground water has been reported to be toward the southeast (1). The nearest residences to the landfill operation are located 0.7 miles southwest between the landfill and the community of [illegible]. These homes, as well as others in the area, obtain water for domestic use from wells located near their homes or from a spring located approximately [illegible] miles northeast of the site. Some wells are shallow, tapping the alluvium, while others penetrate the alluvium and tap a deeper aquifer. Interviews with several of the individuals living in this area revealed that it was a common practice to obtain drinking water from the spring and use the water from shallow wells for other household purposes. Septic tanks, often located relatively near wells, appear to be the only method of sewage disposal in use. There were no domestic wells located near the landfill southeast of the operation. Domestic wells located in the direction of the sub-surface flow [illegible].

This report presents the results of a water quality survey conducted in the vicinity of the [illegible] County Sanitary Landfill site during the calendar year [illegible]. Sampling sites were chosen to be representative of the surface drainage and ground water in the vicinity of the site.

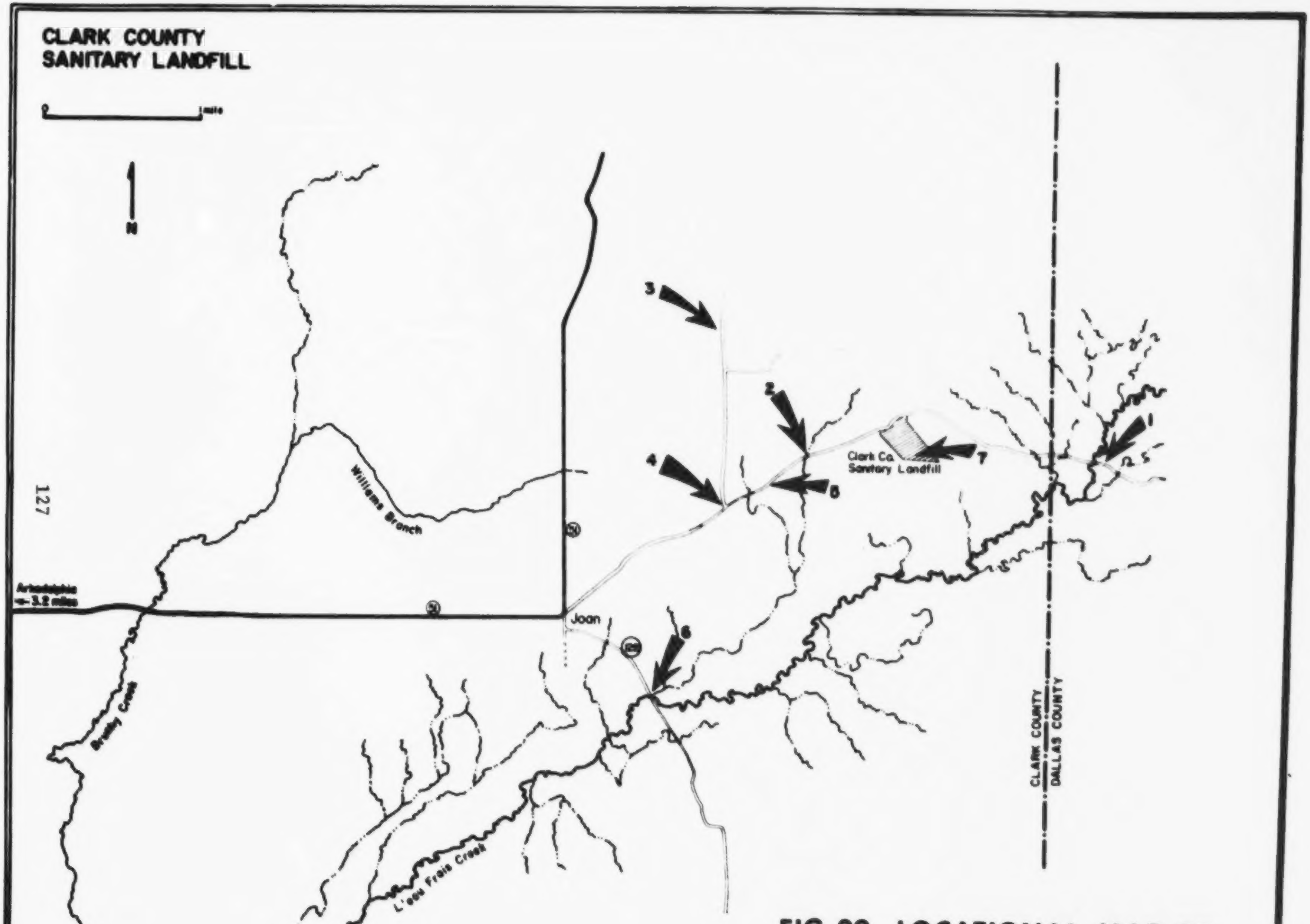

CLARK COUNTY
SANITARY LANDFILL
0
1 mile
N
3
2
4
5
1
7
6
Clark Co.
Sanitary Landfill
Williams Branch
51
51
Arkadelphia
← 3.2 miles
Joan
Bradley Creek
L'eau Frais Creek
CLARK COUNTY
DALLAS COUNTY

FIG 29. LOCATIONAL MAP OF SAMPLING STATIONS

SECTION IV

MATERIALS AND METHODS

Sampling Program:

The location of each of the sampling stations is shown in Figure 1. A description of each station is given below:

1. L'Eau Frais Creek at road crossing in NW 1/4 S18 R17W T7S, approximately 4 miles east of Joan.
2. Samil drainage at road crossing at center of north section line S14 R18W T7S, 2 miles northeast of Joan.
3. Carsey Spring, located in the northeast 1/4 of S10 R18W T7S.
4. Domestic well at residence located on west side of road 1/4 miles south of Mt. Moriah Church (shallow well).
5. Domestic well at residence on south side of road 0.7 miles southwest of landfill site (deep well).
6. L'Eau Frais Creek at road crossing near center of S22 R12W T7S approximately 1/2 mile southeast of Joan.
7. Intermitent drainage located on south edge of landfill site.

Original plans included sampling of two test wells at the site of the landfill. Since county officials were unable to have these test wells drilled, plans for taking these samples were abandoned. Samples were taken from each of the stations at approximately 5 week intervals.

As explained earlier, wells located downstream from the sub-surface flow from the landfill were not located near enough to the operation to have an effect. Thus the decision was made to sample wells located nearest the operation even though the probability of their being effected seemed low. Another reason for choosing these wells for sampling sites was the need to establish existing water quality of these wells in case question of contamination from the operation should arise.

Choice of the spring as a sampling point was made because many people living in this area obtain drinking water from this source. The establishment of the quality of this spring was important simply as background data.

The sampling of L'Eau Frais Creek both above the operation (station 1) and downstream from the operation (station 6) was carried out to determine if the operation of the landfill caused appreciable change in the quality of the creek. Although such contamination seems very unlikely, it was necessary to establish the fact in the early stages of the monitoring program.

Analytical Procedures:

Temperature and dissolved oxygen (surface water samples) were measured in the field suing a Yellow Springs Dissolved Oxygen Analyser. Specific conductance was also measured in the field using a Yellow Springs SCT Meter. pH was measured colorimetrically immediately after collection of the sample. Samples were collected in one liter polyethylene bottles and transported to the laboratory for analysis. With the exception of the constituents which were measured with specific ion electrodes, the analytical methods were essentially those recommended in Standard Methods (3).

Sodium, potassium, calcium, magnesium, iron, and manganese were measured by direct aspiration of the sample into the flame of an atomic absorption spectrometer. Instrument settings and procedures were those recommended by the manufacturer (4). Chloride, fluoride, and ammonia were determined using Orion specific ion electrodes at the condition suggested by the manufacturer (5).

Nitrate was determined using the ultra violet method described in Standard Methods (3). Ortho-phosphate was determined by modification of the extraction method described in Standard Methods (3). Procedures for COD and BOD_5 were in accord with those described in Standard Methods (3).

After beginning the survey, the decision was made to determine fecal coliform in the samples. The membrane filter technique was used for this determination. This parameter is only reported for samples taken after July 1, 1973.

SECTION V

RESULTS AND DISCUSSION

The results of the water quality survey in the vicinity of the Clark County Sanitary Landfill are given in Tables 27 through 45. Dissolved oxygen is reported for only surface samples.

Water temperature varied from 7.9 °C to 24.9 °C. This range is consistent with the range of surface water temperatures observed in the central section of Arkansas.

Dissolved oxygen of the surface water ranged from 4.4 to 13.2 with the higher values occurring in the winter. Values below saturation were observed at Station No. 2 during the months of June, July, and August. Consumption of dissolved oxygen by natural occurring organics is expected during minimum flow periods of the lowland streams which characterize this section of Arkansas. Sub-saturation values were also observed in L'Eau Frais Creek (Station 6) and the intermitent drainage on the site of the landfill (Station 7) during the late fall. Such values are easily explained by the presence of natural occurring organic matter during a low flow condition of the stream. Consistently low values of both COD and BOD during the course of the study indicate that there is very little organic loading of the streams which were studied.

The range of pH values observed for surface water is consistent with lowland streams with a moderate content of humic acids from natural sources (5.5 to 6.7). The pH values observed for the two domestic wells which were sampled showed a general increase during the summer, then a decline in winter. The pH of Carsey Spring (Station 3) was relatively constant throughout the course of the investigation.

The concentration of calcium, magnesium, sodium, and potassium were consistently higher for the two domestic wells. Although the concentration of these constituents were consistently higher in the spring water, values were considerably less than the two domestic wells. This data indicate that the water from the spring has a different origin than the aquifiers of either of the two wells which were sampled.

Chloride values of the two domestic wells were also consistently high indicating that there may be significant salt water intrusion into these aquifiers. The chloride content of the spring was consistently low.

Nitrate concentrations in excess of the maximum allowable concentration for drinking water (45 ppm) were observed at both of the domestic wells during the course of the study. Nitrate concentration of the spring and the surface water in the area appears to be low. There are two possibilities for the origin of the high concentrations of nitrate in the domestic wells. As indicated by the values determined for sodium and chloride, there appears to be some intrusion of salt water into the aquifers feeding these wells. There may be nitrates associated with natural occurring brines in this area. An alternate origin of the high nitrate values could be the infiltration of effluent from neighboring septic tanks.

The occurrence of high nitrate values in the wells studied was reported to the Arkansas State Department of Health. A survey conducted of 14 wells within a five mile radius of Joan during the first week in March 1973 showed nitrate concentrations ranging from 6.7 ppm with three of the wells exceeding the 45 ppm limit. This data indicates that moderate to high concentrations of nitrate in ground water is common throughout this area.

Moderately high values for fecal coliform were observed for both surface and ground water samples during the period from July through December. This parameter was not measured prior to this time. Elevated concentrations of fecal coliform indicate the presence of sewage. Elevated values were found in L'Eau Frais Creek both upstream and downstream from the drainage from the sanitary landfill operation. There is no conclusive evidence to indicate that the origin of the fecal coliform is associated with the operation of the landfill.

With the exception of two samples which showed a manganese concentration of 0.1 ppm, values were below the detection limit of 0.0 ppm. Surface water showed slightly elevated iron contents throughout the study while ground water was consistently low in iron. Moderately high iron concentrations are not uncommon in surface water which contains humic acids which stabilize the iron in solution.

As shown in Table 4, the specific conductance of samples seem to be an adequate indicator of the presence of high chloride water. Should this parameter be measured in future studies, anomolous values, such as those observed at Stations 4 and 5, should be interpreted to indicate the presence of salt water intrusion and possible excessive nitrate values.

The results of phosphate analysis indicate relatively low concentrations of this constituent in both surface and ground water. These data do not indicate the presence of excessive amounts of phosphate.

Temperature (C°)

TABLE 27

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	11.0	10.0	12.5	19.5	23.6	22.1	22.9	21.0	13.0	8.0
2	9.5	10.2	11.0	19.5	24.8	23.9	23.0	22.0	13.5	7.9
3	15.2	15.7	18.0	18.2	18.5	19.2	21.0	20.8	16.8	13.9
4	15.6	16.1	16.0	17.0	18.0	18.5	21.4	20.5	18.0	14.0
5	12.5	17.0	13.0	24.9	22.8	25.3	23.8	23.0	14.8	9.2
6	10.5	9.2	13.0	20.0	24.0	22.1	23.0	21.5	14.0	8.0
7	11.1	11.5	11.8	21.0	23.0	21.6	23.6	22.0	15.5	10.0

Dissolved Oxygen (ppm)   TABLE 28

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	12.2	13.2	10.5	8.4	8.4	11.0	7.7	9.6	9.8	11.6
2	12.2	11.3	10.6	4.6	4.6	4.4	8.8	6.9	9.6	11.7
3										
4										
5										
6	12.0	12.6	10.4	7.5	8.0	9.1	7.8	4.7	9.3	11.5
7	10.7	9.4	7.2	4.6	7.9	7.6	8.7	5.2	7.7	9.9

pH

TABLE 29

	Date of Sample								
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	10/12/73	11/7/73	12/7/73
1	6.2	6.3	5.7	5.7	6.3	6.6	6.3	6.4	6.4
2	5.6	6.1	6.2	6.2	5.5	6.2	6.1	6.6	6.4
3	5.5	5.5	5.7	5.7	5.7	5.5	5.6	5.5	5.5
4	6.6	6.1	7.0	8.5	7.2	7.0	6.9	6.5	6.1
5	7.2	6.9	6.9	8.5	8.5	8.5	8.5	8.5	6.8
6	6.4	6.4	6.4	6.3	6.4	6.7	6.5	6.0	6.2
7	5.5	5.8	5.7	5.7	5.7	5.7	5.6	5.7	6.4

Specific Conductance (μ mhos) TABLE 30

Station No.	1/19/73	3/20/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
	Date of Sample									
1	25	29	33	65	30	39	48	38	35	30
2	38	45	30	90	37	65	69	75	48	42
3	64	60	67	106	59	80	--	78	73	72
4	740	610	700	750	650	750	--	500	580	[illegible]
5	305	350	175	650	449	550	--	205	[illegible]	257
6	29	31	40	67	32	42	62	45	35	30
7	27	29	36	91	35	30	43	50	42	62

C.O.D. (ppm)

TABLE 31

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0	0		10	5	0	6	4	8	0
2	1	0		8	14	0	0	12	5	0
3	0	0		0	0	0	0	0	0	0
4	0	1		9	0	0	0	8	4	0
5	10	0		4	0	0	0	0	4	0
6	1	0		8	6	0	3	7	10	0
7	10	8		6	0	0	0	0	0	0

$B.O.D._5$ (ppm)

TABLE 32

Station No.	Date of Sample 1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	3	11	2	4	7	4	2	0	3	2
2	5	7	2	4	1	3	2	1	0	2
3	3	3	1	1	0	2	1	0	0	2
4	3	3	2	6	0	2	2	0	0	1
5	8	4	2	6	0	3	5	1	0	2
6	6	4	1	3	0	2	2	0	0	1
7	3	2	2	2	0	2	1	0	1	1

Mg (ppm)

TABLE 33

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0.6	0.4	0.5	2.1	0.5	0.5	0.6	0.4	0.5	0.5
2	1.0	1.0	1.0	5.3	0.9	2.0	0.1	1.9	0.9	1.2
3	0.6	0.6	0.6	2.8	0.6	0.5	0.7	0.3	0.5	0.7
4	10	5.0	4.3	21	5.0	4.3	3.4	4.9	4.5	5.0
5	2.8	4.0	3.3	13	3.6	2.4	6.3	4.2	3.2	3.0
6	0.6	0.5	0.5	2.2	0.5	0.4	0.6	0.4	0.5	0.5
7	0.6	0.6	0.5	3.2	0.5	0.4	0.3	0.4	0.7	0.9

Ca (ppm)

TABLE 34

Date of Sample

Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	2.5	1.1	1.3	3.4	0.7	1.2	1.5	1.1	1.1	0.9
2	2.5	1.8	2.1	6.8	0.9	4.1	0.6	3.3	1.4	1.7
3	1.8	1.4	2.1	4.4	0.8	1.4	1.6	2.1	1.5	10.6
4	28	60	35	136	20	40	27	24	19	31
5	6.6	56	43	122	20	40	68	22	28	52
6	2.0	1.4	1.5	7.4	1.0	1.2	3.4	1.8	1.7	1.5
7	0.5	0.8	1.5	3.7	0.6	0.4	1.5	0.6	0.9	1.1

K (ppm)

TABLE 35

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/ 7/73	12/7/73
1	0.7	0.5	0.6	3.6	0.9	0.8	1.5	0.9	0.6	0.9
2	0.7	0.6	0.7	3.0	1.0	0.9	1.7	1.5	0.4	0.9
3	0.6	0.3	0.4	2.7	0.7	0.4	0.5	0.7	0.1	0.4
4	4.9	4.6	5.2	20	5.2	5.7	4.5	5.2	6.3	5.4
5	3.2	3.1	2.9	14	3.6	3.3	5.1	3.4	3.5	2.7
6	0.9	0.5	0.8	4.0	0.9	0.9	1.5	1.1	0.7	0.8
7	0.5	0.5	0.6	4.6	2.9	0.7	1.6	1.0	0.5	1.2

Na (ppm)

TABLE 36

Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
	Date of Sample									
1	1.8	1.3	1.2	7.5	1.8	1.7	1.4	0.8	1.5	1.5
2	2.4	2.5	2.3	9.2	1.6	2.5	0.5	2.2	2.7	2.5
3	5.2	54	4.9	24	5.4	5.6	6.5	4.6	5.9	9.9
4	90	70	53	204	71	61	58	490	54	80
5	32	41	29	122	45	36	52	220	56	23
6	1.8	1.5	1.5	5.7	1.1	1.7	2.5	1.0	1.6	1.4
7	1.4	7.2	1.3	4.3	1.8	1.4	0.5	1.0	1.3	1.2

NH_4 (ppm)

TABLE 37

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1						0.1	0.2	0.1	0.5	0.4
2						0.1	0.2	0.2	0.8	0.3
3						0.0	0.2	0.1	0.9	0.6
4						0.1	0.3	0.2	0.0	0.2
5						0.1	0.2	0.2	4.0	0.3
6						0.2	0.3	0.2	0.4	0.3
7						0.2	0.1	0.1	0.4	0.2

F^- (ppm)

TABLE 38

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0.1	0.1	0.1	0.5	0.0	0.1				
2	0.1	0.1	0.1	0.4	0.0	0.1				
3	0.0	0.0	0.0	0.0	0.0	0.0				
4	0.4	0.3	0.7	1.7	0.4	0.4				
5	0.3	0.2	0.1	0.8	0.4	0.4				
6	0.0	0.0	0.4	0.0	0.0	0.0				
7	0.0	0.1	0.1	0.0	0.0	0.0				

TABLE 39

NO_3^- (ppm)

Date of Sample

Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0.1		0.9	2.1	1.0	0.8	0.8	1.3	0.8	0.4
2	0.8		-	4.4	1.6	1.0	0.6	1.3	0.4	0.1
3	0.3		135	18	7.8	11	12	13	11	8.4
4	240		65	140	75	115	86	150	135	90
5	10		3.7	18	8.7	6.5	6	25	20	18
6	2.0		1.6	32	1.3	1.5	1.3	1.7	0.7	0.3
7	1.1		1.0	7.4	0.3	0.6	0.9	1.1	0.3	0.1

Cl^- (ppm)

TABLE 40

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	2.5	1.2	1.1	1.5	3.6	4.0	10	3.9	5.6	4.6
2	3.6	2.5	0.3	5.4	2.8	5.7	2.4	7.0	7.0	2.0
3	5.6	3.6	0.5	7.5	5.8	7.6	10	10	19	8.4
4	140	170	20	165	92	100	99	190	124	160
5	66	59	9.0	62	53	56	180	47	45	34
6	3.6	2.5	0.2	2.6	3.4	4.1	4.6	6.0	10	7.4
7	2.1	1.3	0.2	0.4	2.1	2.5	1.1	2.6	6.6	4.8

$SO_4^=$ (ppm)

TABLE 41

Station No.	Date of Sample 1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	5.6	2.0	4.0	4.2	3.3	4.3	10	5.4	6.0	5.7
2	5.3	2.0	2.0	6.6	3.2	2.0	16	5.5	4.8	2.2
3	4.4	2.0	2.4	3.3	2.8	4.2	6.6	4.3	3.8	4.0
4	13	7.0	16	17	16	17	23	17	10	17.5
5	11	19	28	23	18	19	23	18	15	23
6	3.5	2.0	4.3	5.2	3.3	4.9	4.6	4.9	3.9	26
7	4.9	2.0	4.4	4.8	3.0	4.2	11	4.2	4.6	0.0

Fe (ppm)

TABLE 42

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0.6	0.2	0.6	2.9	2.3	1.0	0.4	1.2	0.3	0.5
2	0.6	0.2	1.3	2.0	2.4	1.8	8.6	2.1	0.4	0.6
3	0.0	0.1	0.1	0.4	0.3	0.3	0.1	0.0	0.0	0.1
4	0.0	0.0	0.1	0.3	0.3	0.1	0.0	0.0	0.0	0.2
5	0.3	0.1	0.1	0.3	0.4	0.0	0.0	0.0	0.0	0.3
6	0.7	0.2	0.8	3.2	2.5	1.0	0.5	1.2	0.3	0.5
7	0.3	0.3	0.8	5.5	2.1	0.5	6.1	1.7	0.6	0.7

Mn (ppm)

TABLE 43

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.1
6	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.1

$PO_4^{\equiv}$ (ppm)

TABLE 44

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1	0.13	0.02	0.06	0.16	0.09	0.05	0.08	0.12	0.12	0.08
2	0.03	0.02	0.08	0.13	0.13	0.06	0.13	0.12	0.10	0.10
3	0.11	0.00	0.00	0.08	0.00	0.00	0.03	0.00	0.07	0.05
4	0.07	0.01	0.04	0.07	0.00	0.00	0.07	0.08	0.08	0.05
5	0.10	0.01	0.07	0.18	0.10	0.04	0.18	0.17	0.20	0.10
6	0.10	0.03	0.05	0.16	0.09	0.04	0.25	0.06	0.15	0.07
7	0.09	0.01	0.04	0.15	0.00	0.00	0.10	0.00	0.10	0.05

Fecal Coliform (organisms/100 ml)

TABLE 45

	Date of Sample									
Station No.	1/19/73	2/26/73	4/13/73	6/6/73	7/6/73	8/7/73	9/7/73	10/12/73	11/7/73	12/7/73
1					0	0	5920	3160	990	0
2					1560	0	19400	360	270	0
3					0	60	42500	1360	50	300
4					0	70	70	70	120	0
5					0	10	0	60	0	40
6					0	100	850	2360	320	40
7					0	10	200	30	140	0

SECTION VI

REFERENCES

1. Crowson, C.W., Communication to Solid Waste Division, Arkansas Department of Pollution Control and Ecology, May 31, 1972.

2. U.S. Public Health Service, *Drinking Water Standards*, U.S. Department of Health, Education, and Welfare, Rockville, Md., Public Health Service Publication No. 956 (1969).

3. *Standard Methods for the Examination of Water and Waste Water*, APHA, AWWA, and WPCF, New York, 13th Edition (1971).

4. Perkin Elmer Corp., *Analytical Methods for Atomic Absorption Spectroscopy*, Norwalk, Connecticut (1971).

5. Orion Research, Operation Manual for Specific Ion Electrodes (Chloride, Fluoride, and Ammonia), Orion Research, Cambridge, Mass. (1971).

APPENDIX E. Organizational Information

1. Implementing Court Order
2. City Resolution
3. Contractual Agreement

IN THE COUNTY COURT OF CLARK COUNTY, ARKANSAS

IN THE MATTER OF ESTABLISHING A COUNTY-WIDE SOLID WASTE MANAGEMENT SYSTEM AND THE COUNTY ENTERING INTO AGREEMENT WITH THE MUNICIPALITIES, THE STATE AND THE CORPS OF ENGINEERS,

ORDER

Now on this day came on for consideration the matter of Clark County, Arkansas, entering into contractual agreements with its municipalities, the State Parks and Tourism Department, and The Corps of Engineers.

WHEREAS, the County of Clark, including each of its political subdivisions, seeks to improve living conditions within its boundaries by implementing a comprehensive Solid Waste Management System to include a land disposal facility which conforms to State standards of operation and by prohibiting the practices of open burning and open dumping; and,

WHEREAS, the implementation plans for such a Solid Waste Management System have been prepared through joint County-City effort, and the price of same has been established;

It further appears to the Court justification, advantages, and authority of the County entering into such contractual agreement and for providing Solid Waste Collection and Disposal Services has been established by Acts 237 and 238 of the 1971 Legislature, and that it is, accordingly in the best interest of and to the benefit of the County to enter into said Solid Waste Management Program.

IT IS THEREFORE, CONSIDERED, ORDERED and ADJUDGED that the County of Clark prohibit the practices of open burning and dumping and that such service charges to be levied as necessary to cover the cost of a rural collection system and a land disposal facility. The proportion of the annual cost of the system applicable to County government's burden has been set at $27,964.00. Service charges to rural residents are to begin one year following implementation of the Sanitary Landfill and Rural Collection System.

RESOLUTION

WHEREAS, the City of ____________________, Arkansas seeks to improve living conditions in its city by implementing a comprehensive Solid Waste Management System; and

WHEREAS, in order to obtain the funds to implement such a system, it is necessary to obtain grant assistance where possible from the appropriate agencies of the United States Government; and

WHEREAS, the implementation plans for such a Solid Waste Management System have been prepared through joint County-City effort, and the price of same has been established; and

WHEREAS, the City Board (Council) of the City of ____________________, Arkansas is well aware and apprised of the above-mentioned project, and the City of ________________, Arkansas expresses its intent to pass a city ordinance prohibiting open burning and open dumping and to levy such service charges necessary to cover the cost of collection and disposal services for the City of ________________________, Arkansas. Cost of the service has been established at ________________ for one operating year for the City of ____________________, Arkansas. The annual service charge of _______________ will be divided into 12 equal payments that will be paid to the County on a monthly basis. The first payment will be due one year and one month after the Sanitary Landfill and Rural Collection System begins operation.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ______________________, ARKANSAS, that the Mayor of said City, or other persons acting by or under his direction, are hereby, authorized to enter into contractual agreement with the County of Clark, implementing agency for the Solid Waste Management System, for solid waste collection and disposal services to be rendered to the City of ______________________, Arkansas, such contractual agreement to be consummated as expeditiously as possible.

PASSED: ______________________
(Date)

APPROVED: ____________________________
Mayor

Seal

Attest:

____
City Recorder

Cost Breakdown:

Arkadelphia	-	$16,366.00	(Landfill Only)
Gurdon	-	6,922.00	
Amity	-	2,047.00	
Gum Springs	-	899.00	
Okolona	-	780.00	
Whelen Springs	-	422.00	
County (Rural)	-	27,964.00	

SOLID WASTE MANAGEMENT
AGREEMENT

WHEREAS, the statues of the State of Arkansas (Act 237 and 238 of 1973) prohibit the open burning and dumping of waste and require the disposal of waste under a Solid Waste Management System.

AND WHEREAS, Clark County, a sub-division of the State of Arkansas, has undertaken to provide a Solid Waste Management System and has provided a sanitary land fill area in Section 12 - Township 7 South, Range 18 West - and to collect the waste that may accumulate in various areas of the County and dispose of it in said sanitary land fill.

AND WHEREAS, the city of Amity, Arkansas, desires to avail itself of their facilities and services in order that it may comply with the legal requirements.

NOW THEREFORE: The City of Amity, Arkansas, acting by and through its Mayor and City Council, agree that it will pay to Clark County $2,047.00 per annum, payable in four equal quarterly payments due April 1st., July 1st., October 1st., and January 1st. of each year after performance, until cancelled by Ninety (90) days written notice by either party.

For which Clark County agrees:

1. To provide suitable containers for waste and garbage to be placed in agreed strategic locations within said Town and in which the waste and garbage of the County shall be deposited.

2. To pick up, empty and replace the containers twice weekly upon duly scheduled days to be determined by the County.

3. To empty said containers, by depositing the waste and garbage placed therin, in sanitary land fill area in Section 12, Township 7 South, Range 18 West, which shall be properly maintained by the County for such purposes.

IN WITNESS WHEREOF, the name of the City of Amity, Arkansas, duly signed by the Mayor and attested by its recorder and the name of Clark County duly signed by its County Judge has been duly executed, this _____ day of May, 1973.

THE CITY OF AMITY, ARKANSAS

BY ______________________________

ATTEST: ____________________

CLARK COUNTY, ARKANSAS

BY ______________________________
COUNTY JUDGE